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FLOOD INSURANCE STUDY

ORIGINAL

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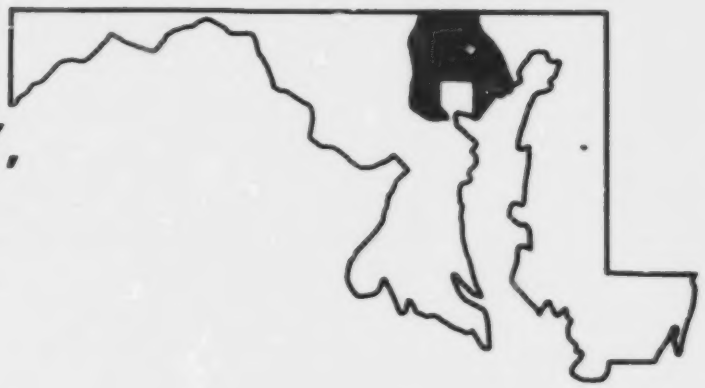
BALTIMORE COUNTY, MARYLAND
UNINCORPORATED AREAS



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OCTOBER 16, 1987

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Federal Emergency Management Agency

COMMUNITY NUMBER - 240010

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program (NFIP) have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study (FIS) may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

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Flood Boundary and Floodway Map

PUBLISHED SEPARATELY:

Flood Insurance Rate Map Index
Flood Insurance Rate Map

FLOOD INSURANCE STUDY
BALTIMORE COUNTY, MARYLAND

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the unincorporated areas of Baltimore County, Maryland, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood risk data for various areas of the community that will be used to establish actuarial flood insurance rates and assist the community in their efforts to promote sound floodplain management. Minimum floodplain management requirements for participation in the National Flood Insurance Program are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the state (or other jurisdictional agency) will be able to explain them.

1.2 Authority and Acknowledgments

The sources of authority for this Flood Insurance Study are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses in this study represent a revision of the original study prepared by the Baltimore District of the U. S. Army Corps of Engineers (COE) for the Federal Emergency Management Agency (FEMA), under Inter-Agency Agreement No. IAA-H-16-75, Project Order No. 2. The work for the original study was completed in October 1976. The hydrologic and hydraulic analyses for the original study were conducted by Stanley Consultants, Inc., under subcontract to the COE.

The hydrologic and hydraulic analyses in this updated study for Roland Run was prepared by the Baltimore County Department of Public Works. This work was completed in August 1986.

1.3 Coordination

In July 1973, an initial Consultation and Coordination Officer's (CCO) meeting was held to identify the streams requiring detailed and

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approximate study. This meeting was attended by representatives of FEMA, the Maryland Department of Environmental Resources, the COE (the original study contractor), and the Baltimore County Office of Planning and Zoning. Also, intermediate meetings were held in March and December 1974. A search for basic data was made at all levels of goverment. The U. S. Geological Survey (USGS) and the Maryland Geological Survey were contacted to obtain flood-flow information. Information concerning the history of Baltimore County and past floods in the area was obtained from the Baltimore County Officer of Information and Research and newpaper files of the Enoch Pratt Free Library.

On November 29, 1979, a final CCO meeting for the original study was held with representatives of FEMA, the county, the original study contractor, and the Maryland Department of Environmental Resources to discuss the results of the study.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the unincorporated areas of Baltimore County, Maryland. The following areas are not included in this study: Prettyboy Reservoir, Liberty Reservoir, Ivy Hill-Oregon Ridge Park, Loch Raven Reservoir, Graham Memorial Park, Green Sanctuary Mememorial Park Cemetery, Woodlawn Cemetery, Double Rock Park, Gardens of Faith Cemetery, Glen L. Martin State Airport, Aberdeen Proving Grounds, Patapsco State Park, Bear Creek Park, Martindale Park, Cox Point Park, U. S. Military Reservation, Gunpowder State Park, Soldiers Delight Natural Environmental Area, Lake Roland Park, Maryland Job Corps Center, Southwest Area Park, Chesterwood Park, Merrit Point Park, Sue Creek Waterfront Park, Turkey Point Park, Concrete Homes Park, Lynch Cove Park, Towson State College, Fox Ridge Park, Inverness Park, West Kingston Park, and Fleming Park. The area of study is shown on the Vicinity Map (Figure 1).

The following flooding sources, or portions of them, were studied by detailed methods: Beaverdam Run, Roland Run, Tributary of Roland Run, Dead Run, Tributary of Dead Run, Gwynns Falls, Herbert Run, East Branch Herbert Run, West Branch Herbert Run, Redhouse Creek, Stemmers Run, Tributary of Stemmers Run, Whitemarsh Run, Honeygo Run, and the Chesapeake Bay. In this updated study, Roland Run was restudied from approximately 100 feet downstream of Joppa Road to approximately 900 feet upstream of Essex Farm Road to incorporate the effects of channel improvements and a flood control dike along the left bank of Roland Run. The areas studied by detailed methods were selected with priority given to all known flood hazard areas and areas of projected development and proposed construction.

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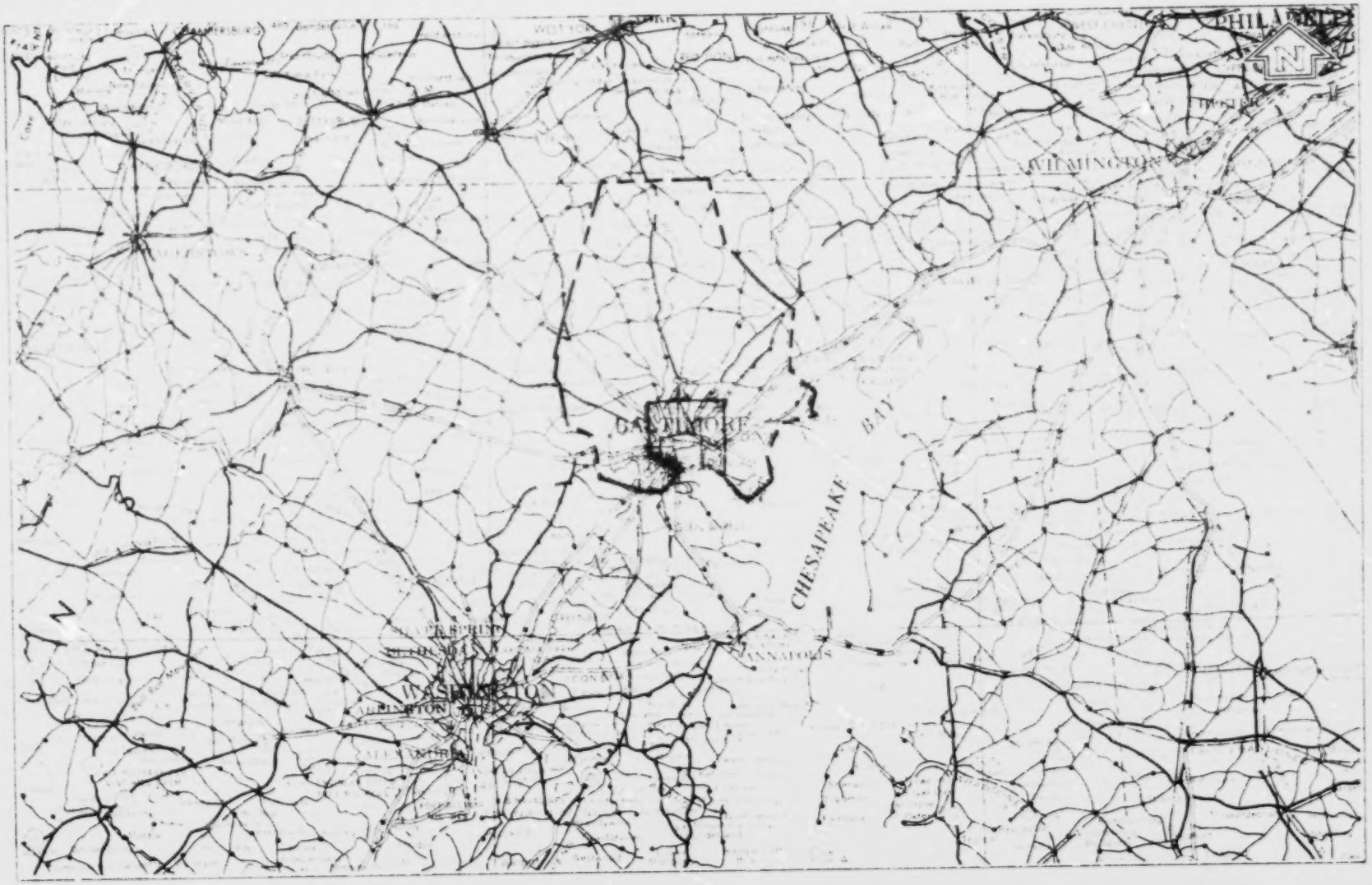

FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

BALTIMORE COUNTY, MD
(UNINCORPORATED AREAS)

APPROXIMATE SCALE
16 0 16 32 48 MILES

VICINITY MAP

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The following flooding sources, or portions of them, along with numerous unnamed streams, were studied by approximate methods: Baisman Run, Beaverdam Run, Beetree Run, Bens Run, Blackrock Run, Bread and Cheese Creek, Brice Run, Brien Run, Buffalo Creek, Bush Cabin Run, Carroll Branch, Charlies Run, Compass Run, Cooks Branch, Cowen Run, Cowpen Run Deadman Run, Deep Run, Deer Creek, Delaware Run, Dick Branch, Dipping Pond Run, Dulaney Valley Branch, Ebaughs Creek, Falls Run, Fitzhugh Run, Georges Run, Granite Branch, Grave Run, Green Branch, Norris Run, North Branch, Gunpowder Falls, Gwynns Falls, Harris Mill Creek, Herring Run, Horsehead Branch, Indian Run, Jenkins Run, Jennifer Branch, Jones Falls, Keysers Run, Little Deer Creek, Little Falls, Little Gunpowder Falls, Little Piney Run, Locust Run, Long Green Creek, Long Quarter Branch, First Mine Branch, Second Mine Branch, Third Mine Branch, Fourth Mine Branch, McGill Run, Merryman Branch, Minebank Run, Moores Branch, Moores Run, Murphy Run, My Ladys Manor Branch, Nelson Branch, Sawmille Branch, Scotts Level Branch, Oregon Branch, Overshot Run, Owl Branch, Patapsco River, Peggys Run, Sweathouse Branch, Timber Run, Towson Run, Towsontown Run, Walker Run, West Branch Herbert Run, Western Run, Whitemarsh Run, Windlass Run, Silver Run, Slade Run, Slaughterhouse Branch, Spring Branch, Stemmers Run, Piney Run, Plumtree Branch, Poplar Run, Prettyboy Branch, Redhouse Creek, Red Run, and Rod Run. Approximate analyses were used to study those areas having a low development potential or minimal flood hazards. The scope and methods of study were proposed to, and agreed upon by, FEMA and Baltimore County.

2.2 Community Description

Baltimore County is located in north-central Maryland, approximately 40 miles northeast of Washington, D. C., and extends from the Chesapeake Bay to the Pennsylvania state line. It is bordered by the unincorporated areas of Harford County to the east; the Borough of New Freedom, and the Townships of Hopewell, Shrewsbury, and Cadorus, Pennsylvania, to the north; the unincorporated areas of Kent County to the southeast; the unincorporated areas of Anne Arundel County and the City of Baltimore to the south; the unincorporated areas of Howard County to the southwest; and the unincorporated areas of Carroll County to the west.

The majority of the county lies in the Gunpowder Falls, the Little Gunpowder Falls, and the Patapsco River drainage basins. The northeast corner of the county lies in the Susquehanna River basin. The coastal plain and the southern portion of the Piedmont area are drained by several smaller streams.

The Patapsco River forms the southern and southwestern boundaries of Baltimore County. Herbert Run flows in south-central Baltimore County from Wynnewood south to the Patapsco River. Herbert Run is formed by the confluence of West Branch Herbert Run, which flows east and south from its headwaters in Catonsville, and East Branch Herbert Run, which flows due south from its headwaters near Kenwood. Dead Run and Gwynns Falls

are streams of substantial size in the west-central part of the county. Dead Run flows east from the vicinity of Rutherford Airfield to the western limits of the City of Baltimore. Gwynns Falls flows southeast from Reisterstown to the western corporate limits of the City of Baltimore. The south-central part of the county, just north of the City of Baltimore, is drained in part by Roland Run, which flows into Lake Roland, near Ruxton. Beaverdam Run flows north and east from its headwaters south of Big Spring, through Cockeysville, and enters Western Run near Ashland.

Little Gunpowder Falls forms part of the eastern county boundary and drains much of the extreme eastern study area, as well as parts of neighboring Harford County. Between the City of Baltimore and the Gunpowder River are several streams such as Redhouse Creek, Stemmers Run, Whitemarsh Run, and Honeygo Run, all of which drain into tidal waters. The Chesapeake Bay lies along the southeast side of the county, between the City of Baltimore and the Baltimore-Harford county boundary.

When Baltimore County was established in 1659, it was bounded by the Chester River to the east, the Patapsco River to the west and south, and latitude 40 to the north. Between that time and 1919, the county was reduced to its present size of 610 square miles. Prior to World War II, the majority of the land was in large estates. Since the war, suburban developments have been created out of many of the estates (Reference 1). No incorporated communities exist in the county, but there are at least 31 distinct community areas, ranging in population from 2,500 to 72,000. The county-wide population was estimated to have been in excess of 671,000 persons in 1974. Since 1956, the county government has operated under a state charter (Reference 2). The rate of population growth in Baltimore County has decreased during recent years; the population is expected to continue to grow at a slower but steady rate in the foreseeable future (Reference 3).

Approximately 41 percent of the land area in the county is occupied by woodlands. Many of the floodplain areas in south and central Baltimore County contain numerous commercial, industrial, and residential developments, and public utilities. Numerous streets, highways, and rail lines cross the floodplains. Continuing economic development is expected and pressures leading to intensified floodplain use will undoubtedly accompany such development.

The topography of the county is diversified, ranging from the low, flat and poorly drained coastal plain to the low hills and ridges of the Piedmont area. The weather can change quickly due to frequent shifts in wind directions. The seasons are distinct, but the net effect of the mountains to the west and the bay and ocean to the east is to produce a

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more equable climate compared with other continental locations further inland at the same latitude. Hurricanes and accompanying heavy rainfall are common enough to be of concern, particularly along the waterfronts and shores. Record temperatures range from 102 degrees Fahrenheit (°F) to -7°F at nearby Baltimore-Washington International Airport. The average annual maximum and minimum temperatures in this area are 65°F and 45°F, respectively, and the average annual precipitation is in excess of 41 inches (Reference 4).

2.3 Principal Flood Problems

Floods in Baltimore County are ususally caused by spring thaws or by rainfall associated with hurricanes. In July 1968, extremely damaging floods occurred across the county. Flooding from streams throughout the county caused an estimated $2,000,000 worth of damage and killed approximately 50 people. Other recent major floods in Baltimore County occurred on August 23, 1933; March 11, 1936; October 15, 1954; August 1, 1971; June 22, 1972; and September 26, 1975.

In recent years, the percentage of rainfall runoff has undoubtedly been increased by development, which increases the imperviousness of surfaces of the watersheds. One of the largest measured floods in Baltimore County was the result of runoff from the rainfall associated with Tropical Storm Agnes, which occurred in June 1972. The Agnes flood caused massive damage and destruction in the county. In the southeastern portion of the county, the largest measured floods occurred on August 1, 1971, not in June 1972.

In some parts of the county, floodplain development has been extensive. Consequently, floodwaters that would have been harmless in predevelopment times now endanger lives and damage buildings, roads, and utilities. A prime example of this is the lower portion of Gwynns Falls.

Many bridges over streams in the county act as significant constrictive hydraulic structures. Even during small floods, upstream ponding occurs until floodwaters can flow through small bridge openings or over the top of high roadways. The Old Court Road bridge over Gwynns Falls, the Baltimore and Ohio Railroad bridge over Herbert Run, and a downstream bridge at Interchange 33 over Stemmers Run are examples of bridges in Baltimore County that are constrictive.

2.4 Flood Protection Measures

The four existing reservoirs in the county are Loch Raven and Prettyboy in the Gunpowder Falls basin, Liberty in the Patapsco River basin, and Lake Roland in the Jones Falls basin. All four reservoirs were created

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as water-supply sources for the metropolitan Baltimore area and have no flood control capapcities. There have been numerous short lengths of stream realignment and channel smoothing projects throughout the county, especially in connection with bridge construction. These improvements generally suffer from a lack of maintenance, and brush, debris, and silt have collected along many of the once-improved areas. The original projects were generally too small to affect major floods appreciably. Improvements to short reaches do little more than allow some floodwaters to pass through a given area slightly faster, only to increase flood problems at the next constriction downstream.

A stormwater detention basin was built in 1976 on each of two tributaries to West Herbert Run. One basin is located in the northeast corner of the University of Maryland, Baltimore County campus, a short distance west of the intersection of Circle Drive and Regina Drive. The other basin is located a short distance west of the intersection of Dolores Avenue and Brewster Street.

There is a dike located on Roland Run. FEMA specifies that all dikes or levees must have a minimum of 3 foot freeboard against 100-year flooding to be considered a safe flood protection structure. This dike meets the FEMA freeboard requirements.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the county, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude which are expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10, 2, 1, and 0.2 percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood (1 percent chance of annual exceedence) in any 50-year period is approximately 40 percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

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3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency and peak elevation-frequency relationships for each flooding source studied in detail affecting the county.

The principal sources of data for defining the discharge-frequency relationships for the streams studied by detailed methods were 20 stream flow gages located in or near Baltimore County. The stream flow records at the various gaging stations ranged in length from 13 to 48 years. These records were used to calculate the 10-, 50-, 100-, and 500-year peak discharge estimates at the appropriate gage using techniques developed by the Water Resources Council (Reference 5). The skew coefficient used in the calculations was based on consideration of both the gage data and regional characteristics. This consideration showed that there were only small variations in the skew coefficient obtained from a regional map of skew as compared to one calculated from the gage data (Reference 5).

The available records were also used to develop a regional relationship between the mean flow and the drainage area. The regional relationship developed for the mean flow in the Baltimore County area was compared with the results obtained from a recent application of a generalized regional method developed by the COE (Reference 6). The comparison indicated that there were negligible differences between the results.

Regional relationships developed in this manner were based, for the most part, upon flows from rural and developing areas. To account for the influence of urbanization in heavily developed areas of Baltimore County, an uranization factor was introduced (References 7 and 8). The urbanization factor had little or no effect on the 100- and 500-year peak flows but increased the 10- and 50-year values in varying amounts depending on the size of the drainage area and the imperviousness of the ground cover.

Frequency-discharge, drainage area curves for the streams studied by detailed methods are shown in Figure 2.

Flood elevations for the tidal areas of Baltimore County were taken from a study prepared by the Virginia Institute of Marine Sciences (Reference 9). That study provided estimates of storm surges caused by both tropical and extra-tropical storms combined with astronomical tides for 23 locations in the Chesapeake Bay region. Elevations for the Baltimore County area were interpolated using data in the report developed for the stations located in Baltimore Harbor and at Havre de Grace, Maryland. Predicted storm-surge elevations for selected locations in Baltimore County are given in Table 1, "Summary of Elevations."

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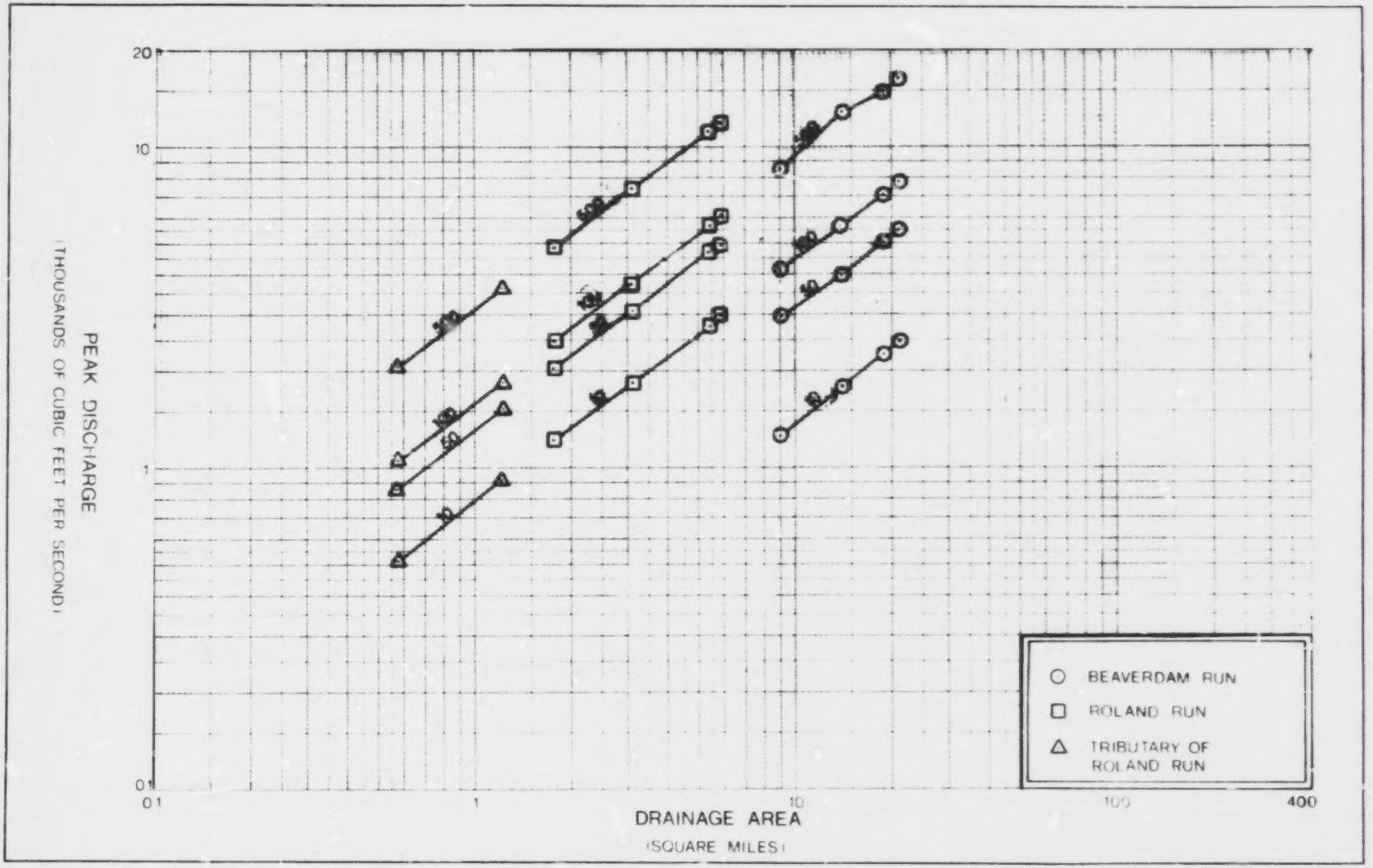

FIGURE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

BALTIMORE COUNTY, MD
(UNINCORPORATED AREAS)

FREQUENCY-DISCHARGE, DRAINAGE AREA CURVES

BEAVERDAM RUN, ROLAND RUN, TRIBUTARY OF ROLAND RUN

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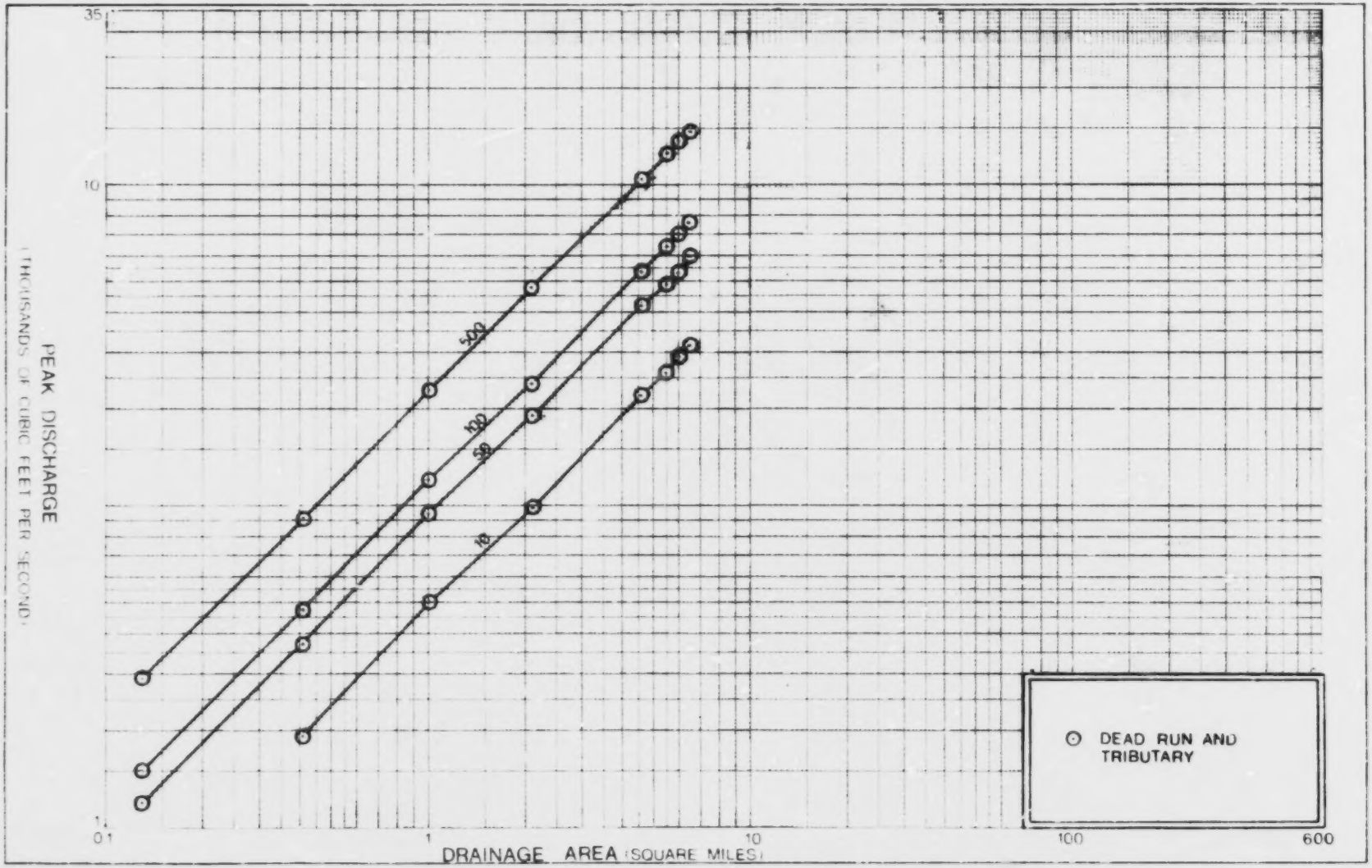

FIGURE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

BALTIMORE COUNTY, MD
(UNINCORPORATED AREAS)

FREQUENCY-DISCHARGE, DRAINAGE AREA CURVES

DEAD RUN AND TRIBUTARY

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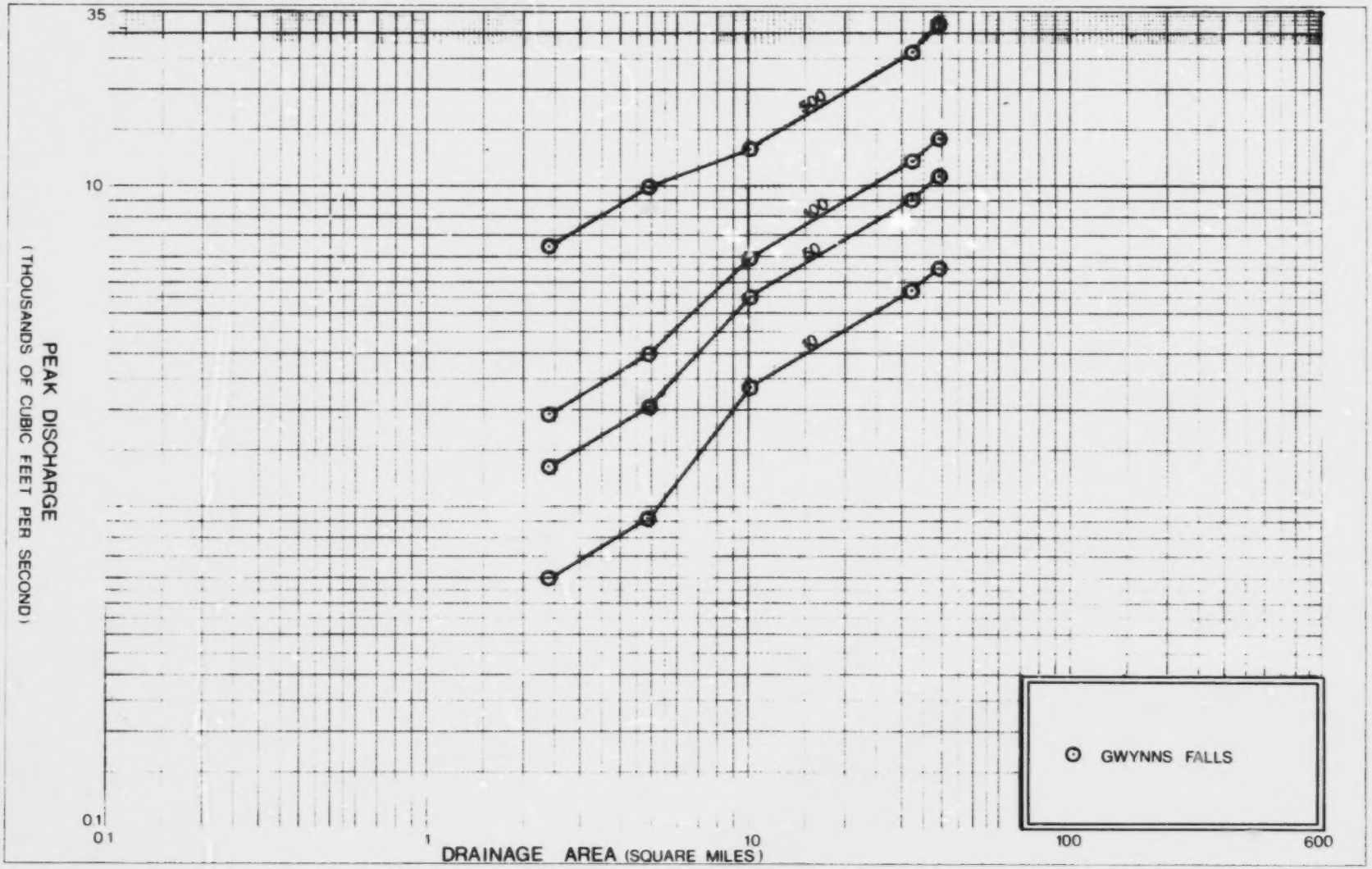

FIGURE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

BALTIMORE COUNTY, MD
(UNINCORPORATED AREAS)

FREQUENCY - DISCHARGE, DRAINAGE AREA CURVES

GWYNNS FALLS

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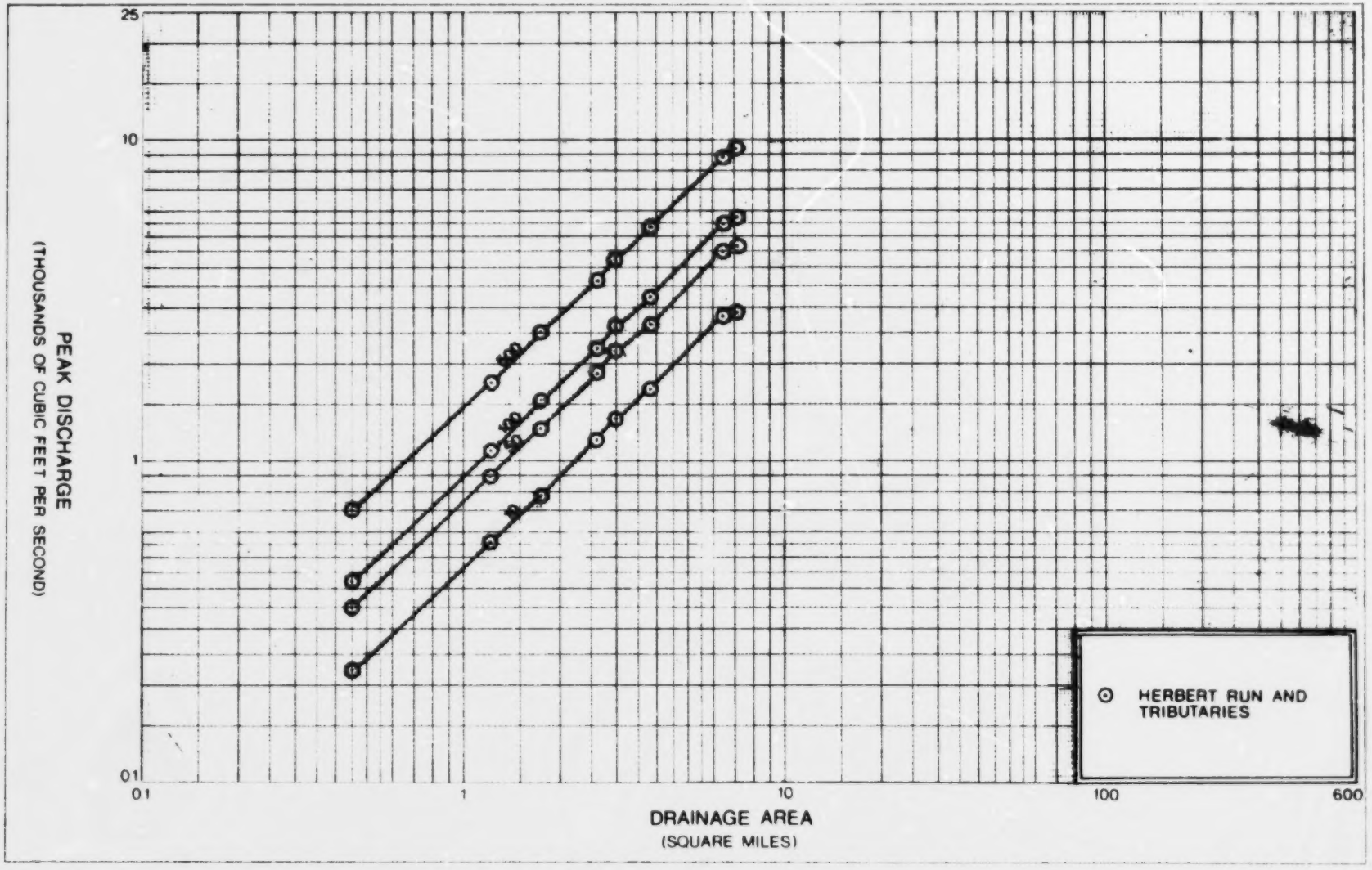

FIGURE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

BALTIMORE COUNTY, MD
(UNINCORPORATED AREAS)

FREQUENCY-DISCHARGE, DRAINAGE AREA CURVES

HERBERT RUN AND TRIBUTARIES

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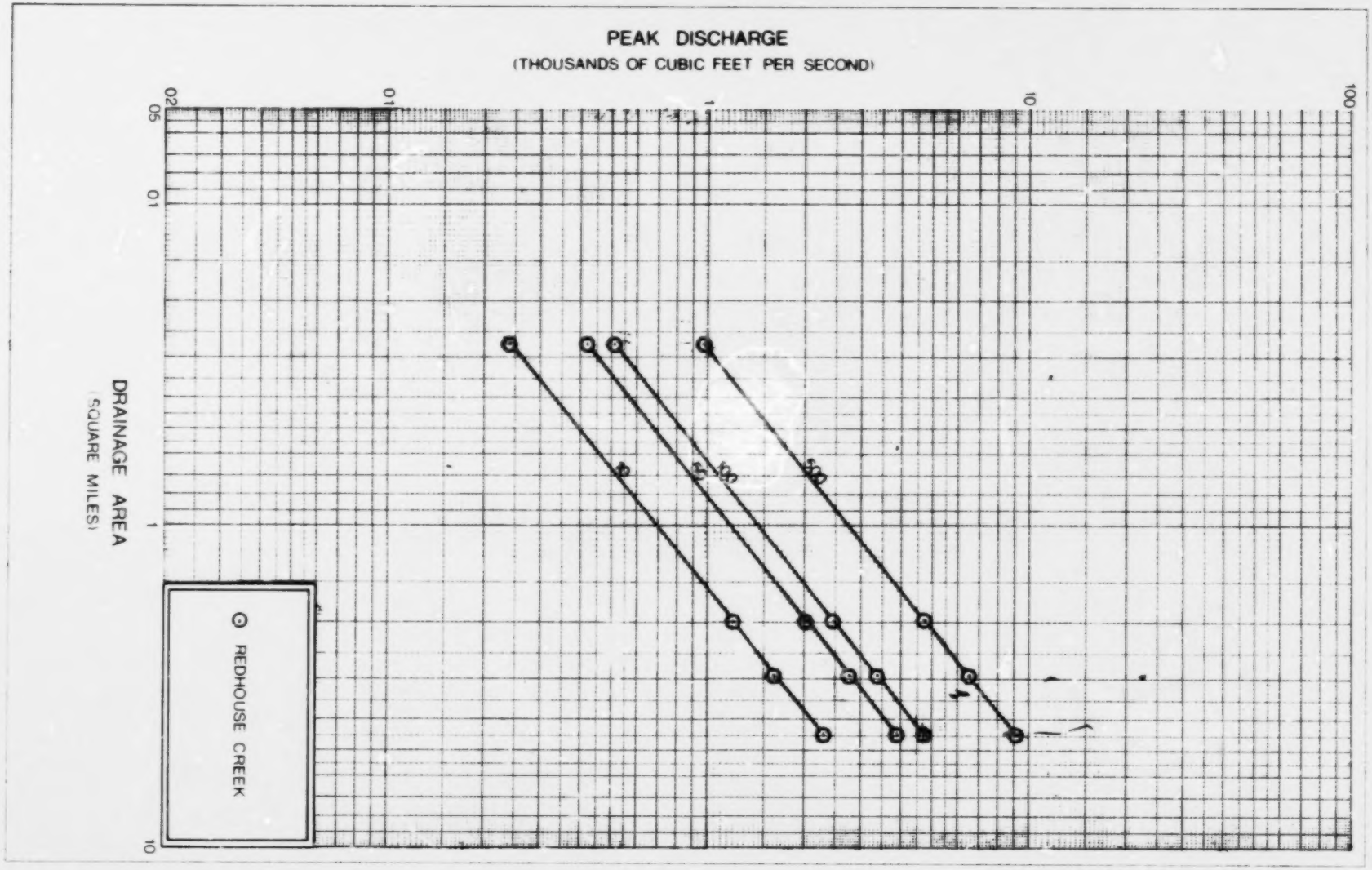

FIGURE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

BALTIMORE COUNTY, MD
(UNINCORPORATED AREAS)

FREQUENCY-DISCHARGE, DRAINAGE AREA CURVES

REDHOUSE CREEK

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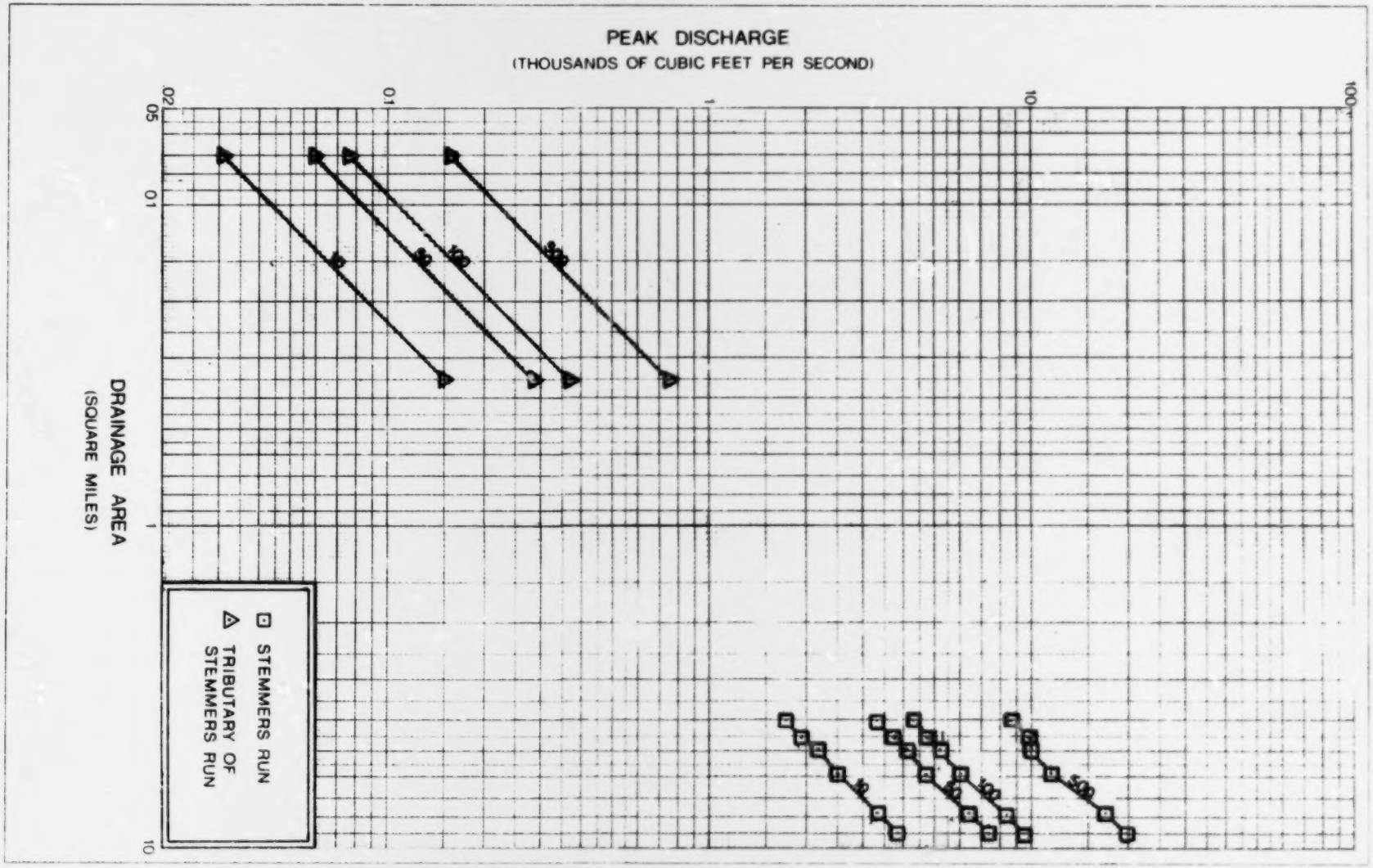

FIGURE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

BALTIMORE COUNTY, MD
(UNINCORPORATED AREAS)

FREQUENCY-DISCHARGE, DRAINAGE AREA CURVES

STEMMERS RUN, TRIBUTARY OF STEMMERS RUN

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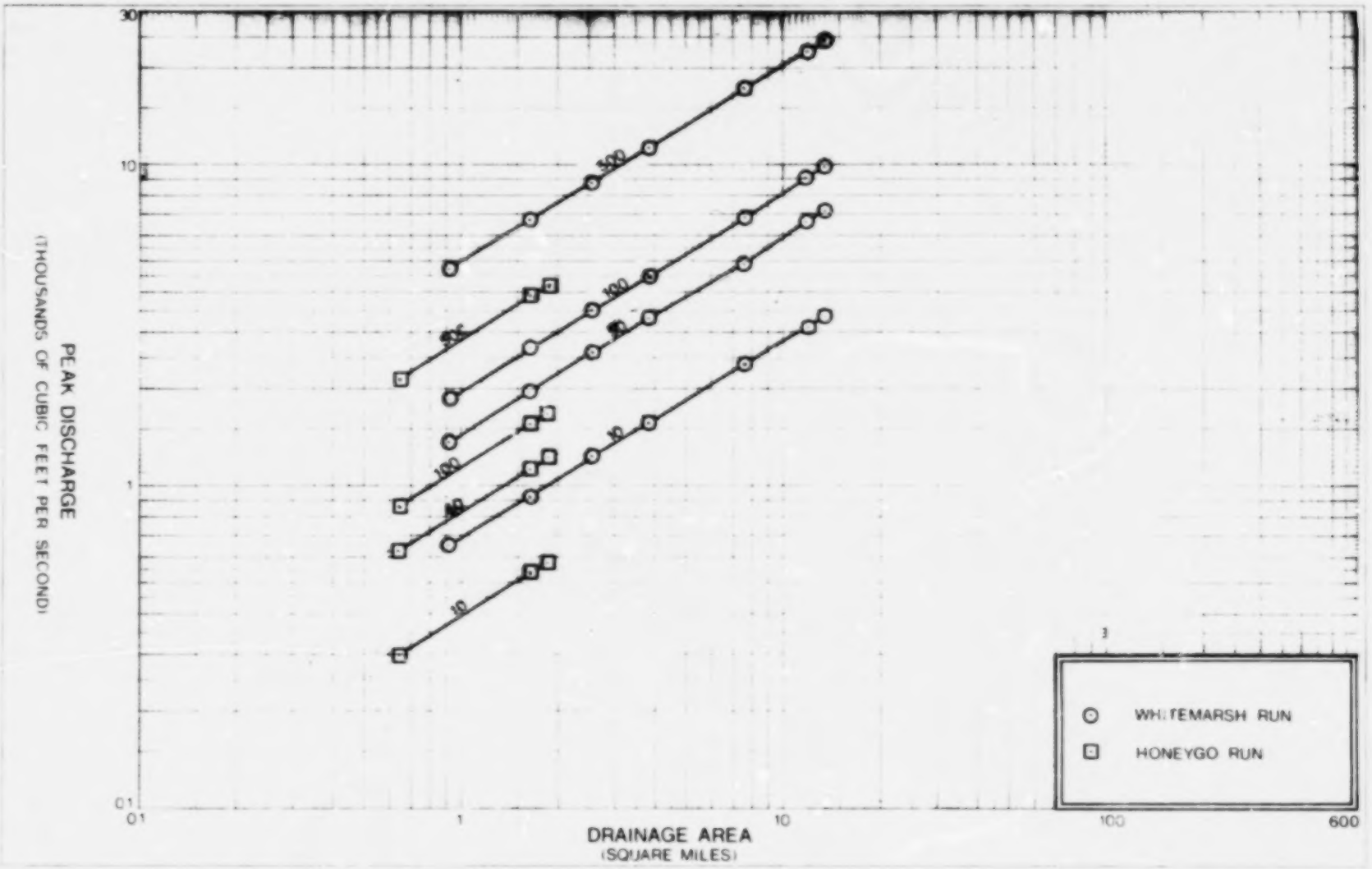

FIGURE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

BALTIMORE COUNTY, MD
(UNINCORPORATED AREAS)

FREQUENCY-DISCHARGE , DRAINAGE AREA CURVES

WHITEMARSH RUN, HONEYGO RUN

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TABLE 1 - SUMMARY OF STILLWATER ELEVATIONS

FLOODING SOURCE AND LOCATION	ELEVATION (feet) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
CHESAPEAKE BAY				
Patapsco River to Back River	5.1	8.0	9.4	12.0
Middle River to Gunpowder River	5.4	8.7	10.2	13.0

For the streams studied by approximate methods, the approximate peak discharges of the 100-year frequency floods were determined using the equation and parameters developed by the Maryland Geological Survey (Reference 10).

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals.

Cross sections for the backwater analyses of the streams studied by detailed methods were field surveyed. Cross sections were located at close intervals above and below bridges and culverts in order to compute the significant bacwater effects of these structures.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway was computed (Section 4.2), selected cross section locations are also shown on the Flood Boundary and Floodway Map (Exhibit 2).

Water-surface elevations of floods of the selected recurrence intervals were computed using the COE HEC-2 step-backwater computer program (Reference 11). Flood profiles were drawn showing computed water-surface elevations for floods of the selected recurrence intervals.

Starting water-surface elevations for Beaverdam Run were taken from stage-discharge data for past floods on this stream. For Roland Run, Dead Run, Herbert Run, and Whitemarsh Run, starting water-surface elevations were determined by the slope/area method. Starting water-surface elevations for Tributary of Roland Run, Tributary of Dead Run, East Branch Herbert Run, West Branch Herbert Run, and Tributary to Stemmers Run were taken from the elevations of floods of equal recurrence intervals on the receiving streams. This assumption of coincident peak

flows is valid because of the similar sizes and characteristics of the drainage basins of the respective streams. For Gwynns Falls, starting water-surface elevations were taken from the Flood Insurance Study for the City of Baltimore (Reference 12). For Redhouse Creek, starting water-surface elevations were taken from tidal backwater elevations from the Chesapeake Bay. For Stemmers Run, the starting water-surface elevation for the 10-year flood was determined by the slope/area method; for the 50-, 100-, and 500-year floods, starting water-surface elevations were taken from tidal backwater elevations from the Chesapeake Bay. Starting water-surface elevations for Honeygo Run were developed by interpolation between tidal-flood elevations and the elevations determined at the first cross section on Whitemarsh Run.

Roughness coefficients (Manning's "n") for the backwater computations were assigned on the basis of field inspection of floodplain areas. The channel and overbank "n" values for the streams studied by detailed methods are shown in the following tabulation:

Stream	Channel "n"	Overbank "n"
Beaverdam Run	0.040-0.060	0.040-0.120
Roland Run	0.030-0.100	0.030-0.990
Tributary of Roland Run	0.030-0.070	0.035-0.100
Dead Run	0.030-0.040	0.040-0.080
Tributary of Dead Run	0.040	0.065-0.070
Gwynns Falls	0.020-0.050	0.035-0.080
Herbert Run	0.030-0.040	0.030-0.080
East Branch Herbert Run	0.035	0.040-0.070
West Branch Herbert Run	0.035-0.060	0.035-0.070
Redhouse Creek	0.030-0.070	0.030-0.080
Stemmers Run	0.030-0.060	0.035-0.080
Tributary of Stemmers Run	0.030-0.060	0.035-0.080
Whitemarsh Run	0.035-0.045	0.035-0.080
Honeygo Run	0.030-0.060	0.035-0.080

For the streams studied by approximate methods that were not taken from USGS Flood-Prone Area maps, approximate flood elevations were developed based upon field examination of sites where significant changes to the extent of flooding would be likely to occur (Reference 13).

All elevations are referenced to Baltimore County Datum or mean low tide. For comparison, the National Geodetic Vertical Datum of 1929 (NGVD) is 0.811 feet above mean low tide or Baltimore County Datum. Elevation reference marks used in this study are shown on the maps.

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The hydraulic analyses for this study were based on unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The National Flood Insurance Program encourages State and local governments to adopt sound floodplain management programs. Therefore, each Flood Insurance Study produces maps designed to assist communities in developing floodplain management measures.

4.1 Flood Boundaries

To provide a national standard without regional discrimination, the 1 percent annual chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2 percent annual chance (500-year) flood is employed to indicate additional areas of flood risk in the community. For the flooding sources studied in detail, the 100- and 500-year floodplain boundaries have been delineated using topographic maps at a scale of 1:12,000 with contour intervals of 10 and 20 feet (References 14 and 15). For Roland Run, Gwynns Falls, Redhouse Creek, and Stemmers Run, the flood boundaries were checked and, in some cases, adjusted with topographic maps at a scale of 1:1,200 with a contour interval of 2 feet (References 16, 17, 18, and 19). Flood boundaries on Whitemarsh Run were checked and adjusted using topographic maps at a scale of 1:2,400 with a contour interval of 5 feet (Reference 20).

For certain streams studied by approximate methods, the boundary of the 100-year flood was taken from USGS Flood-Prone Area maps; extents were modified frequently as a result of on-site examination of the streams (Reference 13). For the remainder of the streams studied by approximate methods, the boundary of the 100-year flood was based upon field examination of sites where significant changes to the extent of flood would be likely to occur. Between such points the boundaries were interpolated using the same topographic maps used for the streams studied in detail (References 14 and 15).

The 100- and 500-year floodplain boundaries are shown on the Flood Boundary and Floodway Map (Exhibit 2). In cases where the 100- and 500-year floodplain boundaries are close together, only the 100-year floodplain boundary has been shown. Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

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4.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the National Flood Insurance Program, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 100-year floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment so that the 100-year flood can be carried without substantial increases in flood heights. Minimum federal standards limit such increases to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this study are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway studies. Encroachment into the 100-year floodplain may conflict with local oridnances; therefore, FEMA recommends that the Baltimore County Department of Permits and Licenses be consulted before any filling is considered as a means of flood proofing.

The floodways presented in this study were computed on the basis of equal conveyance reduction from each side of the floodplain. The results of these computations are tabulated at selected cross sections for each stream segment for which a floodway is computed (Table 2).

A floodway is not appropriate in areas inundated by floodwaters from the Chesapeake Bay; thus, no floodway was prepared for estuarial areas where flooding results from high levels on the Chesapeake Bay rather than from high stream flow.

As shown on the Flood Boundary and Floodway Map (Exhibit 2), the floodway boundaries were computed at cross sections. Between cross sections, the boundaries were interpolated. In cases where the floodway and 100-year floodplain boundaries are either close together or collinear, only the floodway boundary has been shown.

The area between the floodway and 100-year floodplain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood by more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 3.

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FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION[3]			
CROSS SECTION	DISTANCE	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE (FEET)
Beaverdam Run								
A	0[1]	954	14,538	0.5	257.2	257.2	258.2	1.0
B	128[1]	698	6,089	1.3	257.7	257.7	258.6	0.9
C	877[1]	274	3,550	2.2	257.8	257.8	258.7	0.9
D	1,577[1]	657	7,681	1.0	258.4	258.4	259.3	0.9
E	1,731[1]	473	4,963	1.6	258.6	258.6	259.5	0.9
F	3,854[1]	1,084	5,031	1.6	258.9	258.9	259.9	1.0
G	5,544[1]	369	742	9.6	265.9	265.9	266.4	0.5
H	5,704[1]	305	2,038	3.5	268.7	268.7	269.7	1.0
I	6,634[1]	727	3,069	1.9	270.1	270.1	271.1	1.0
J	9,474[1]	341	777	7.3	285.0	285.0	285.0	0.0
Roland Run								
A	52[2]	200	1,456	4.2	235.0	235.0	235.8	0.8
B	799[2]	153	946	6.4	235.6	235.6	236.1	0.5
C	1,493[2]	311	2,281	2.7	237.6	237.6	238.5	0.9
D	1,769[2]	254	2,007	3.0	238.1	238.1	239.1	1.0
E	2,750[2]	214	1,447	4.0	238.8	238.8	239.7	0.9
F	3,003[2]	290	2,261	2.5	240.8	240.8	241.8	1.0
G	3,984[2]	108	522	11.0	245.2	245.2	245.3	0.1

[1]Feet above Loch Raven Reservoir
[2]Feet above L'Hirondelle Club Road
[3]Baltimore County Datum

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

BALTIMORE COUNTY, MD
(UNINCORPORATED AREAS)

FLOODWAY DATA

BEAVERDAM RUN AND ROLAND RUN

BEST COPY AVAILABLE

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION[3]			
CROSS SECTION	DISTANCE	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE (FEET)
Tributary of Roland Run								
A	14,219[1]	185	319	5.8	314.3	314.3	314.3	0.0
B	14,361[1]	217	654	2.8	316.1	316.1	316.1	0.0
C	15,770[1]	93	231	8.1	335.1	335.1	335.5	0.4
D	18,098[1]	80	339	3.1	361.1	361.1	361.6	0.5
E	18,241[1]	154	600	1.8	361.8	361.8	362.2	0.4
F	19,540[1]	63	162	6.5	373.5	373.5	373.6	0.1
G	19,980[1]	30	97	10.9	378.1	378.1	378.1	0.0
Dead Run								
A	335[2]	86	508	15.0	292.5	292.5	292.5	0.0
B	470[2]	133	1,098	6.9	299.0	299.0	299.0	0.0
C	550[2]	163	1,165	6.0	299.0	299.0	299.5	0.5
D	795[2]	140	1,151	6.1	299.7	299.7	300.4	0.7
E	2,490[2]	92	488	14.3	308.3	308.3	308.3	0.0
F	3,050[2]	98	542	12.9	312.3	312.3	312.3	0.0
G	3,770[2]	73	435	14.7	316.4	316.4	316.4	0.0
H	4,870[2]	384	2,043	3.1	319.4	319.4	319.5	0.1
I	6,170[2]	269	605	10.6	324.9	324.9	324.9	0.0

[1]Feet above L'Hirondelle Club Road
[2]Feet above county boundary
[3]Baltimore County Datum

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

BALTIMORE COUNTY, MD
(UNINCORPORATED AREAS)

FLOODWAY DATA

TRIBUTARY OF ROLAND RUN AND DEAD RUN

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION[2]			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Roland Run (continued)								
H	4,159	234	1,731	3.3	247.3	247.3	248.2	0.9
I	4,781	118	751	7.6	247.3	247.3	248.2	0.9
J	5,615	90	433	13.2	253.5	253.5	253.5	0.0
K	5,836	90	776	7.4	257.5	257.5	258.1	0.6
L	6,024	69	657	8.7	258.9	258.9	258.9	0.0
M	6,974	270	936	6.1	261.8	261.8	262.2	0.4
N	7,127	250	842	6.8	262.6	262.6	262.8	0.2
O	7,873	200	826	6.9	266.0	266.0	266.0	0.0
P	9,011	166	525	7.2	276.6	276.6	276.6	0.0
Q	9,521	131	407	9.3	279.7	279.7	280.0	0.3
R	9,671	119	576	6.5	281.0	281.0	281.7	0.7
S	9,891	450	3,659	1.0	289.4	289.4	289.4	0.0
T	11,146	496	923	2.7	289.5	289.5	289.5	0.0
U	11,806	382	2,429	1.0	299.2	299.2	300.0	0.8
V	12,153	415	1,933	1.3	299.2	299.2	300.0	0.8

[1]Feet above L'Hirondelle Club Road

[2]Baltimore County Datum

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

BALTIMORE CO., MD

(UNINCORPORATED AREAS)

FLOODWAY DATA

ROLAND RUN

BEST COPY AVAILABLE

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION[2]			
CROSS SECTION	DISTANCE[1]	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE (FEET)
Dead Run (continued)								
J	6,745	75	634	8.4	329.1	329.1	329.4	0.3
K	6,995	70	789	6.7	330.8	330.8	331.2	0.4
L	9,860	100	279	8.6	338.5	338.5	338.5	0.0
M	10,930	55	383	6.3	345.8	345.8	346.2	0.4
N	11,210	100	540	4.4	348.4	348.4	349.0	0.6
O	12,490	112	132	9.1	355.4	355.4	355.4	0.0
P	12,750	105	494	2.4	360.9	360.9	360.9	0.0
Q	13,169	95	236	5.1	361.0	361.0	361.1	0.1
R	13,651	113	607	2.0	369.8	369.8	369.8	0.0
S	14,065	51	145	8.3	373.2	373.2	373.2	0.0
T	14,290	46	262	4.6	375.2	375.2	375.9	0.7
U	15,320	45	124	9.7	382.7	382.7	383.4	0.7
V	15,560	56	262	4.6	388.1	388.1	388.9	0.8
W	16,130	88	163	7.4	394.1	394.1	394.1	0.0
X	16,606	52	131	9.2	401.5	401.5	402.4	0.9

[1]Feet above county boundary
[2]Baltimore County Datum

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

BALTIMORE COUNTY, MD
(UNINCORPORATED AREAS)

FLOODWAY DATA

DEAD RUN

BEST COPY AVAILABLE

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION[3]			
CROSS SECTION	DISTANCE	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE (FEET)
Tributary of Dead Run								
A	250[1]	15	51	9.3	376.7	376.7	376.9	0.2
B	1,075[1]	20	52	9.1	400.3	400.3	400.8	0.5
C	1,975[1]	12	46	10.3	416.7	416.7	417.5	0.8
Gwynns Falls								
A	0[2]	526	4,801	3.0	286.1	286.1	287.1	1.0
B	1,350[2]	209	1,560	9.1	294.1	294.1	294.4	0.3
C	2,299[2]	91	1,122	12.7	302.1	302.1	303.1	1.0
D	3,220[2]	215	2,355	6.0	308.1	308.1	308.5	0.4
E	3,965[2]	271	2,606	5.4	308.6	308.6	309.4	0.8
F	4,175[2]	447	3,519	4.0	308.8	308.8	309.6	0.8
G	4,560[2]	424	3,337	4.3	309.1	309.1	309.9	0.8
H	4,660[2]	434	3,356	4.2	309.2	309.2	310.0	0.8
I	4,760[2]	483	3,305	4.3	309.4	309.4	310.1	0.7
J	6,010[2]	135	1,007	14.1	310.7	310.7	310.8	0.1
K	15,595[2]	397	4,304	2.9	367.7	367.7	368.1	0.4
L	16,740[2]	117	922	13.6	369.3	369.3	369.7	0.4
M	19,615[2]	514	3,567	3.4	377.7	377.7	378.3	0.6

[1] Feet above confluence with Dead Run
[2] Feet above county boundary
[3] Baltimore County Datum

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

BALTIMORE COUNTY, MD
(UNINCORPORATED AREAS)

FLOODWAY DATA

TRIBUTARY OF DEAD RUN AND GWYNNS FALLS

BEST COPY AVAILABLE

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION[2]			
CROSS SECTION	DISTANCE[1]	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE (FEET)
Gwynns Falls (continued)								
AF	43,450	391	3,068	3.4	419.8	419.8	420.1	0.3
AG	44,954	145	1,415	7.1	427.9	427.9	428.5	0.6
AH	45,770	352	2,617	3.8	429.5	429.5	430.4	0.9
AI	48,550	447	2,717	3.7	433.1	433.1	434.1	1.0
AJ	51,580	656	1,842	5.5	441.0	441.0	442.0	1.0
AK	53,030	964	2,507	2.4	446.1	446.1	446.4	0.3
AL	54,216	116	466	12.8	449.3	449.3	449.3	0.0
AM	54,483	374	1,371	4.3	454.5	454.5	454.7	0.2
AN	55,764	107	446	13.3	458.2	458.2	458.2	0.0
AO	56,016	154	760	7.8	462.9	462.9	463.3	0.4
AP	56,840	51	384	15.5	464.2	464.2	464.9	0.7
AQ	58,334	77	621	9.6	473.3	473.3	474.3	1.0
AR	58,605	121	1,052	5.7	477.2	477.2	477.2	0.0
AS	58,792	194	1,323	4.5	477.3	477.3	477.5	0.2
AT	62,440	86	455	13.1	493.0	493.0	493.0	0.0
AU	63,290	51	382	15.6	497.5	497.5	498.1	0.6
AV	66,675	314	1,710	3.5	514.9	514.9	515.9	1.0
AW	66,905	485	2,310	2.6	516.2	516.2	516.8	0.6

[1]Feet above county boundary
[2]Baltimore County Datum

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

BALTIMORE COUNTY, MD
(UNINCORPORATED AREAS)

FLOODWAY DATA

GWYNNS FALLS

BEST COPY AVAILABLE

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION[2]			
CROSS SECTION	DISTANCE[1]	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE (FEET)
Gwynns Falls (continued)								
N	21,970	348	2,403	5.0	380.5	380.5	381.1	0.6
O	23,510	396	3,563	3.4	382.7	382.7	383.6	0.9
P	23,610	628	4,693	2.6	382.8	382.8	383.8	1.0
Q	23,710	621	4,780	2.5	382.9	382.9	383.8	0.9
R	25,760	138	1,041	11.5	386.1	386.1	386.4	0.3
S	27,605	337	3,270	3.7	392.5	392.5	393.4	0.9
T	29,270	302	3,347	3.6	393.6	393.6	394.4	0.8
U	29,370	271	2,785	4.3	393.6	393.6	394.5	0.9
V	29,470	317	3,581	3.4	393.9	393.9	394.7	0.8
W	29,690	163	1,549	7.7	394.0	394.0	394.7	0.7
X	31,830	295	2,414	5.0	399.2	399.2	400.1	0.9
Y	35,120	675	5,361	1.9	408.2	408.2	408.2	0.0
Z	37,790	415	2,473	4.2	409.4	409.4	409.4	0.0
AA	39,600	338	1,980	5.3	412.2	412.2	412.6	0.4
AB	40,656	342	2,812	3.7	413.4	413.4	414.3	0.9
AC	40,884	301	2,556	4.1	416.3	416.3	417.2	0.9
AD	41,150	247	1,746	6.0	416.3	416.3	417.3	1.0
AE	42,430	344	2,460	4.2	417.8	417.8	418.4	0.6

[1] Feet above county boundary
[2] Baltimore County Datum

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

BALTIMORE COUNTY, MD
(UNINCORPORATED AREAS)

FLOODWAY DATA

GWYNNS FALLS

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION[3]			
CROSS SECTION	DISTANCE	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE (FEET)
Gwynns Falls (continued)								
AX	68,230[1]	105	360	8.3	523.2	523.2	523.7	0.5
AY	70,797[1]	274	659	4.6	542.1	542.1	542.3	0.2
AZ	71,039[1]	341	1,468	2.0	543.4	543.4	544.4	1.0
BA	72,020[1]	104	395	7.6	546.3	546.3	546.7	0.4
BB	72,427[1]	257	1,438	2.1	548.4	548.4	549.4	1.0
BC	72,632[1]	199	1,238	2.4	548.9	548.9	549.6	0.7
BD	73,245[1]	275	533	5.6	560.4	560.4	561.0	0.6
BE	73,355[1]	298	1,007	3.0	561.6	561.6	562.6	1.0
BF	73,400[1]	309	1,119	2.7	561.8	561.8	562.8	1.0
BG	73,620[1]	277	865	3.5	563.2	563.2	563.3	0.1
BH	75,030[1]	103	346	8.7	567.9	567.9	568.7	0.8
BI	76,850[1]	161	674	4.5	582.0	582.0	582.9	0.9
BJ	77,070[1]	187	573	5.2	583.3	583.3	584.2	0.9
Herbert Run								
A	325[2]	319	2,071	2.8	17.4	17.4	18.4	1.0
B	805[2]	373	3,048	1.9	18.4	18.4	19.3	0.9
C	1,560[2]	224	1,908	3.0	18.7	18.7	19.6	0.9

[1]Feet above county boundary
[2]Feet above confluence with Patapsco River
[3]Baltimore County Datum

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

BALTIMORE COUNTY, MD
(UNINCORPORATED AREAS)

FLOODWAY DATA

GWYNNS FALLS AND HERBERT RUN

BEST COPY AVAILABLE

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION[3]			
CROSS SECTION	DISTANCE	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE (FEET)
Herbert Run (continued)								
D	3,282[1]	333	757	7.5	21.5	21.5	21.6	0.1
E	3,787[1]	1,108	18,036	0.3	45.9	45.9	45.9	0.0
F	4,428[1]	590	9,894	0.6	45.9	45.9	45.9	0.0
G	4,610[1]	605	10,115	0.5	45.9	45.9	45.9	0.0
H	5,123[1]	744	9,935	0.6	46.0	46.0	46.0	0.0
I	5,778	94	1,528	3.6	46.0	46.0	46.0	0.0
East Branch Herbert Run								
A	1,940[2]	67	236	9.5	46.1	45.3[4]	45.3	0.0
B	2,310[2]	65	266	8.5	47.9	47.9	47.9	0.0
C	2,463[2]	30	262	8.6	49.8	49.8	50.6	0.8
D	2,920[2]	77	279	8.1	51.9	51.9	52.8	0.9
E	3,420[2]	75	416	5.4	55.5	55.5	55.7	0.2
F	4,130[2]	25	157	14.3	62.2	62.2	62.2	0.0
G	4,712[2]	54	359	6.3	67.6	67.6	67.8	0.2
H	5,308[2]	50	199	11.3	69.5	69.5	69.5	0.0
I	5,464[2]	217	959	2.3	74.8	74.8	75.7	0.9

[1]Feet above confluence with Patapsco River
[2]Feet above confluence with Herbert Run
[3]Baltimore County Datum
[4]Elevation computed without consideration of backwater effects from Herbert Run

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

BALTIMORE COUNTY, MD
(UNINCORPORATED AREAS)

FLOODWAY DATA

HERBERT RUN AND EAST BRANCH HERBERT RUN

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FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION [2]			
CROSS SECTION	DISTANCE [1]	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE (FEET)
East Branch Herbert Run (continued)								
J	6,117	55	227	9.9	76.0	76.0	76.0	0.0
K	6,253	41	252	8.9	78.1	78.1	78.3	0.2
L	6,605	58	324	7.0	80.1	80.1	80.3	0.2
M	7,331	148	327	3.3	88.8	88.8	88.8	0.0
N	8,094	23	147	7.4	92.4	92.4	92.5	0.1
O	8,348	36	170	6.3	93.2	93.2	93.5	0.3
P	8,507	39	129	8.4	93.3	93.3	93.6	0.3
Q	8,823	47	152	7.1	99.9	99.9	100.1	0.2
R	9,145	150	634	1.7	101.6	101.6	102.6	1.0
S	9,476	43	205	5.3	104.0	104.0	105.0	1.0
T	10,095	73	434	2.5	115.8	115.8	116.8	1.0
U	11,316	49	462	2.3	126.8	126.8	127.0	0.2
V	11,696	29	151	7.2	131.6	131.6	131.7	0.1
W	12,002	63	188	5.8	132.7	132.7	132.9	0.2

[1] Feet above confluence with Herbert Run
[2] Baltimore County Datum

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

BALTIMORE COUNTY, MD
(UNINCORPORATED AREAS)

FLOODWAY DATA

EAST BRANCH HERBERT RUN

BEST COPY AVAILABLE

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION[3]			
CROSS SECTION	DISTANCE	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE (FEET)
West Branch Herbert Run								
A	1,140[1]	95	893	3.6	46.1	46.1	46.2	0.1
B	1,925[1]	56	246	13.2	46.1	46.1	46.2	0.1
C	2,686[1]	66	269	12.1	52.2	52.2	52.2	0.0
D	3,187[1]	71	422	7.7	63.8	63.8	63.8	0.0
E	3,312[1]	46	454	7.2	64.1	64.1	64.5	0.4
F	4,345[1]	42	196	13.3	67.8	67.8	67.8	0.0
G	4,455[1]	47	302	8.6	71.2	71.2	71.2	0.0
H	5,360[1]	72	249	10.5	76.0	76.0	76.2	0.2
I	5,500[1]	102	799	3.3	83.7	83.7	83.7	0.0
J	7,563[1]	40	133	11.4	102.3	102.3	102.5	0.2
K	8,009[1]	121	251	6.1	115.4	115.4	115.4	0.0
L	8,171[1]	276	1,451	1.0	121.5	121.5	121.5	0.0
M	8,470[1]	172	599	2.5	121.5	121.5	121.5	0.0
Redhouse Creek								
A	1,020[2]	166	920	5.2	9.4	8.4[4]	9.4	1.0
B	1,289[2]	154	798	6.0	9.4	9.0[4]	10.0	1.0
C	1,558[2]	149	756	6.3	9.9	9.9	10.9	1.0

[1]Feet above confluence with Herbert Run
[2]Feet above confluence with Back River
[3]Baltimore County Datum
[4]Elevations computed without consideration of backwater effects from Chesapeake Bay

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

BALTIMORE COUNTY, MD
(UNINCORPORATED AREAS)

FLOODWAY DATA

WEST BRANCH HERBERT RUN AND REDHOUSE CREEK

BEST COPY AVAILABLE

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION[2]			
CROSS SECTION	DISTANCE[1]	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE (FEET)
Redhouse Creek (continued)								
T	16,470	26	61	8.4	80.6	80.6	81.1	0.5
U	18,250	20	70	7.3	139.8	139.8	140.8	1.0
Stemmers Run								
A	5,650	761	6,385	1.5	16.8	16.8	17.0	0.2
B	6,478	386	2,211	3.8	16.8	16.8	17.0	0.2
C	6,993	420	2,741	3.0	17.2	17.2	17.4	0.2
D	7,397	315	4,227	2.0	20.2	20.2	20.7	0.5
E	7,670	279	3,508	2.4	20.3	20.3	21.0	0.7
F	8,674	250	2,929	2.1	20.4	20.4	21.3	0.9
G	10,557	155	460	13.3	22.0	22.0	22.3	0.3
H	11,536	274	1,456	4.2	27.6	27.6	27.6	0.0
I	12,745	499	1,885	2.8	31.1	31.1	31.1	0.0
J	13,383	97	563	8.5	33.9	33.9	33.9	0.0
K	14,468	67	382	12.6	41.4	41.4	41.9	0.5
L	17,093	467	2,422	1.8	48.3	48.3	49.3	1.0
M	17,526	535	2,034	2.1	48.8	48.8	49.5	0.7

[1]Feet above confluence with Northeast Creek

[2]Baltimore County Datum

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

BALTIMORE COUNTY, MD
(UNINCORPORATED AREAS)

FLOODWAY DATA

REDHOUSE CREEK AND STEMMERS RUN

BEST COPY AVAILABLE

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION [2]			
CROSS SECTION	DISTANCE [1]	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE (FEET)
Redhouse Creek (continued)								
D	1,827	69	416	11.4	11.2	11.2	11.9	0.7
E	2,096	51	421	11.3	13.5	13.5	14.2	0.7
F	8,834	399	3,478	1.0	37.4	37.4	37.5	0.1
G	10,210	278	1,216	2.8	37.5	37.5	37.6	0.1
H	10,310	275	1,121	3.0	37.6	37.6	37.7	0.1
I	10,370	274	1,081	3.1	37.7	37.7	37.7	0.0
J	10,849	238	717	4.7	38.4	38.4	38.5	0.1
K	11,389	93	319	10.6	40.7	40.7	40.7	0.0
L	11,551	137	713	4.8	43.7	43.7	44.5	0.8
M	13,200	344	450	5.5	50.3	50.3	50.4	0.1
N	13,540	150	900	2.7	55.0	55.0	55.7	0.7
O	13,718	76	556	4.4	55.2	55.2	55.8	0.6
P	13,822	73	256	9.6	55.7	55.7	56.2	0.5
Q	14,113	51	277	8.9	60.6	60.6	60.9	0.3
R	14,303	51	406	6.1	63.3	63.3	63.5	0.2
S	14,417	99	766	3.2	65.0	65.0	65.7	0.7

[1] Feet above confluence with Back River

[2] Baltimore County Datum

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

BALTIMORE COUNTY, MD
(UNINCORPORATED AREAS)

FLOODWAY DATA

REDHOUSE CREEK

BEST COPY AVAILABLE

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION [3]			
CROSS SECTION	DISTANCE	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE (FEET)
Tributary of Stemmers Run								
A	731[1]	244	2,389	0.2	69.3	69.3	70.3	1.0
B	816[1]	200	1,675	0.2	69.3	69.3	70.3	1.0
C	985[1]	202	1,676	0.2	69.3	69.3	70.3	1.0
D	1,041[1]	205	1,710	0.2	69.3	69.3	70.3	1.0
E	1,131[1]	202	1,686	0.2	69.3	69.3	70.3	1.0
F	1,680[1]	34	48	7.7	80.2	80.2	80.2	0.0
G	2,644[1]	56	91	4.1	96.0	96.0	96.0	0.0
H	2,896[1]	12	38	2.0	102.0	102.0	102.1	0.1
I	4,380[1]	19	13	5.8	177.5	177.5	177.5	0.0
Whitemarsh Run								
A	7,140[2]	360	1,878	4.8	21.5	21.5	22.5	1.0
B	10,780[2]	120	779	11.6	30.5	30.5	31.2	0.7
C	11,325[2]	273	1,230	7.4	39.9	39.9	40.9	1.0
D	12,263[2]	262	3,381	2.7	51.5	51.5	51.5	0.0
E	12,376[2]	258	1,857	4.9	51.7	51.7	51.7	0.0
F	13,458[2]	708	2,835	3.2	53.1	53.1	53.7	0.6
G	13,602[2]	766	7,043	1.3	53.6	53.6	54.4	0.8

[1] Feet above confluence with Stemmers Run
[2] Feet above confluence with Bird River
[3] Baltimore County Datum

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

BALTIMORE COUNTY, MD
(UNINCORPORATED AREAS)

FLOODWAY DATA

TRIBUTARY OF STEMMERS RUN AND WHITEMARSH RUN

BEST COPY AVAILABLE

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION[2]			
CROSS SECTION	DISTANCE[1]	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE (FEET)
Whitemarsh Run (continued)								
H	15,010	263	1,179	5.9	53.6	53.6	54.4	0.8
I	16,200	407	2,541	2.7	57.1	57.1	58.0	0.9
J	19,230	77	476	14.5	63.1	63.1	63.3	0.2
K	19,349	118	820	8.4	66.7	66.7	67.5	0.8
L	22,450	85	524	8.7	77.8	77.8	78.8	1.0
M	24,850	64	348	13.0	101.3	101.3	101.7	0.4
N	27,214	236	898	5.1	115.5	115.5	116.5	1.0
O	27,326	217	777	5.8	116.2	116.2	116.9	0.7
P	29,200	340	1,146	3.1	127.0	127.0	127.4	0.4
Q	31,212	110	359	9.9	142.6	142.6	142.6	0.0
R	31,427	178	1,883	1.9	157.4	157.4	157.4	0.0
S	34,470	70	266	10.2	170.6	170.6	171.1	0.5
T	36,664	80	234	11.5	222.6	222.6	222.6	0.0
U	36,776	28	178	15.2	225.5	225.5	225.5	0.0
V	39,161	57	238	11.3	256.0	256.0	256.1	0.1
W	39,299	40	248	10.9	258.6	258.6	258.7	0.1
X	40,756	33	152	12.4	277.3	277.3	277.4	0.1

[1]Feet above confluence with Bird River
[2]Baltimore County Datum

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

BALTIMORE COUNTY, MD
(UNINCORPORATED AREAS)

FLOODWAY DATA

WHITEMARSH RUN

BEST COPY AVAILABLE

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION[2]			
CROSS SECTION	DISTANCE[1]	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE (FEET)
Honeygo Run								
A	820	807	2,724	0.6	14.4	14.3	15.3	1.0
B	1,905	257	818	2.1	17.3	17.3	17.9	0.6
C	3,090	55	157	10.7	27.7	27.7	27.7	0.0
D	3,238	242	1,019	1.7	32.3	32.3	32.3	0.0
E	4,614	85	207	8.1	38.6	38.6	38.6	0.0
F	5,979	50	293	5.8	46.1	46.1	46.3	0.2
G	6,429	91	596	2.8	51.1	51.1	51.2	0.1
H	8,664	47	151	10.4	60.4	60.4	60.5	0.1
I	11,344	40	144	10.9	120.9	120.9	120.9	0.0
J	12,866	50	153	10.3	151.0	151.0	151.0	0.0
K	13,001	32	342	4.6	159.1	159.1	159.2	0.1
L	14,134	101	138	6.2	166.9	166.9	166.9	0.0
M	14,874	38	178	4.8	172.5	172.5	173.0	0.5
N	15,802	20	80	10.8	185.6	185.6	185.7	0.1
O	15,925	48	277	3.1	188.4	188.4	189.4	1.0

[1]Feet above confluence with Whitemarsh Run

[2]Baltimore County Datum

[3]Elevation computed without consideration of backwater effects of Whitemarsh Run

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

Federal Insurance Administration

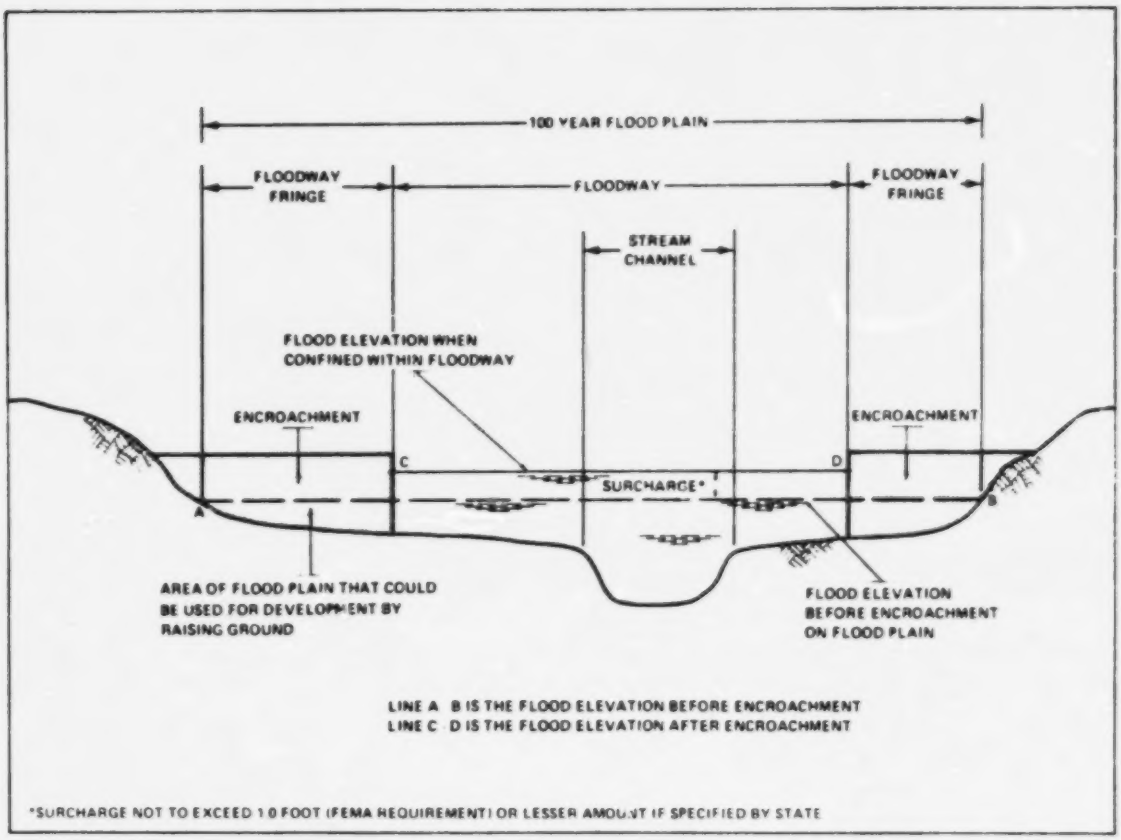
BALTIMORE COUNTY, MD

(UNINCORPORATED AREAS)

FLOODWAY DATA

HONEYGO RUN

BEST COPY AVAILABLE


100 YEAR FLOOD PLAIN
FLOODWAY FRINGE
FLOODWAY
FLOODWAY FRINGE
STREAM CHANNEL
FLOOD ELEVATION WHEN CONFINED WITHIN FLOODWAY
ENCROACHMENT
ENCROACHMENT
C
D
SURCHARGE*
A
B
AREA OF FLOOD PLAIN THAT COULD BE USED FOR DEVELOPMENT BY RAISING GROUND
FLOOD ELEVATION BEFORE ENCROACHMENT ON FLOOD PLAIN
LINE A B IS THE FLOOD ELEVATION BEFORE ENCROACHMENT
LINE C D IS THE FLOOD ELEVATION AFTER ENCROACHMENT
*SURCHARGE NOT TO EXCEED 1.0 FOOT (FEMA REQUIREMENT) OR LESSER AMOUNT IF SPECIFIED BY STATE

FLOODWAY SCHEMATIC

Figure 3

Near the mouths of streams studied in detail, floodway computations are made without regard to flood elevations on the receiving water body. Therefore, "Without Floodway" elevations presented in Table 2 for certain downstream cross sections of East Branch Herbert Run, Redhouse Creek, and Honeygo Run are lower than the regulatory flood elevations in that area, which must take into account the 100-year flooding due to backwater from other sources.

5.0 INSURANCE APPLICATION

To establish actuarial insurance rates, data from the engineering study must be transformed into flood insurance criteria. This process includes the determination of reaches, Flood Hazard Factors, and flood insurance zone designations for each flooding source studied in detail in the unincorporated areas of Baltimore County.

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5.1 Reach Determinations

Reaches are defined as sections of floodplain that have relatively the same flood hazard, based on the average weighted difference in water-surface elevations between the 10- and 100-year floods. This difference may not have a variation greater than that indicated in the following tabulation for more than 20 percent of the reach:

Average Difference Between 10- and 100-Year Floods	Variation
Less than 2 feet	0.5 foot
2 to 7 feet	1.0 foot
7.1 to 12 feet	2.0 feet
More than 12 feet	3.0 feet

The locations of the reaches determined for the flooding sources of Baltimore County are shown on the Flood Profiles (Exhibit 1) and summarized in Table 3.

Reaches are defined as sections of floodplain that have relatively the same flood hazard. In tidal areas, reaches are limited to the distance for which the 100-year flood elevation does not vary more than 1.0 foot. Using these criteria, reaches were required for the flooding source of the Chesapeake Bay. The locations of these reaches are shown on the Flood Insurance Rate Map and summarized in Table 3.

5.2 Flood Hazard Factors

The Flood Hazard Factor (FHF) is used to establish relationships between depth and frequency of flooding in any reach. This relationship is then used with depth-damage relationships for various classes of structures to establish actuarial insurance rate tables.

The FHF for a reach is the average weighted difference between the 10- and 100-year flood water-surface elevations rounded to the nearest one-half foot, multiplied by 10, and shown as a three-digit code. For example, if the difference between water-surface elevations of the 10- and 100-year floods is 0.7 foot, the FHF is 005; if the difference is 1.4 feet, the FHF is 015; if the difference is 5.0 feet, the FHF is 050. When the difference between the 10- and 100-year flood water-surface elevations is greater than 10.0 feet, it is rounded to the nearest whole foot.

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BEST COPY AVAILABLE

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FHF	ZONE	BASE FLOOD ELEVATION[3]
		10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)			
Beaverdam Run							
Reach 1	235	-9.2	-2.8	+16.4	090	A18	Varies
Reach 2	235	-5.7	-2.6	+16.1	055	A11	Varies
Reach 3	235	-2.8	-1.2	+6.8	030	A6	Varies
Roland Run							
Reach 1	245	-2.2	-0.6	+2.5	020	A4	Varies
Reach 2	245	-3.3	-1.2	+4.9	035	A7	Varies
Tributary of Roland Run							
Reach 1	245	-2.4	-0.7	+2.3	025	A5	Varies
Reach 2	245	-1.1	-0.3	+1.2	010	A2	Varies
Dead Run							
Reach 1	380,390	-3.4	-1.1	+2.9	035	A7	Varies
Reach 2	360,380	-1.2	-0.3	+1.9	010	A2	Varies

[1] Flood Insurance Rate Map Panel
[2] Weighted average
[3] Baltimore County Datum, rounded to nearest foot – see map

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

BALTIMORE COUNTY, MD
(UNINCORPORATED AREAS)

FLOOD INSURANCE ZONE DATA

BEAVERDAM RUN, ROLAND RUN, TRIBUTARY OF ROLAND RUN AND DEAD RUN

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FHF	ZONE	BASE FLOOD ELEVATION[3]
		10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)			
Tributary of Dead Run							
Reach 1	360,380	-1.0	-0.3	+1.4	010	A2	Varies
Gwynns Falls							
Reach 1	220,240,380	-3.8	-1.3	+4.8	040	A8	Varies
Reach 2	220	-3.5	-1.2	+5.1	035	A7	Varies
Reach 3	220	-1.5	-0.6	+2.6	015	A3	Varies
Reach 4	220	-3.9	-1.3	+4.5	040	A8	Varies
Reach 5	210,220	-1.8	-0.7	+3.0	020	A4	Varies
Herbert Run							
Reach 1	505	-2.7	-0.7	+2.3	025	A5	Varies
Reach 2	505	-13.0	-6.3	+8.2	130	A23	Varies
East Branch Herbert Run							
Reach 1	390,505	-2.0	-0.7	+2.7	020	A4	Varies
Reach 2	390	-1.6	-0.3	+1.1	015	A3	Varies

[1]Flood Insurance Rate Map Panel

[2]Weighted average

[3]Baltimore County Datum, rounded to nearest foot – see map

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

BALTIMORE COUNTY, MD
(UNINCORPORATED AREAS)

FLOOD INSURANCE ZONE DATA

TRIBUTARY OF DEAD RUN, GWYNNS FALLS, HERBERT RUN AND EAST BRANCH HERBERT RUN

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FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FHF	ZONE	BASE FLOOD ELEVATION[3]
		10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)			
West Branch Herbert Run							
Reach 1	390,505	-3.2	-1.2	+3.3	030	A6	Varies
Redhouse Creek							
Reach 1	410,420	-1.5	-0.6	+2.5	015	A3	Varies
Reach 2	410	-5.9	-2.6	+2.5	060	A12	Varies
Reach 3	410	-2.2	-0.8	+3.3	020	A4	Varies
Reach 4	410	-0.4	-0.1	+0.4	005	A1	Varies
Stemmers Run							
Reach 1	430	-4.6	-1.5	+6.4	045	A9	Varies
Reach 2	430	-2.5	-0.6	+2.2	025	A5	Varies
Reach 3	410,430	-7.7	-1.6	+4.9	075	A15	Varies
Reach 4	410	-11.1	-2.7	+6.1	110	A21	Varies

[1]Flood Insurance Rate Map Panel

[2]Weighted average

[3]Baltimore County Datum, rounded to nearest foot – see map

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

BALTIMORE COUNTY, MD
(UNINCORPORATED AREAS)

FLOOD INSURANCE ZONE DATA

WEST BRANCH HERBERT RUN, REDHOUSE CREEK AND STEMMERS RUN

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FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FHF	ZONE	BASE FLOOD ELEVATION[3]
		10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)			
Tributary of Stemmers Run							
Reach 1	430	-7.0	-1.9	+6.3	070	A14	Varies
Reach 2	430	-3.9	-1.3	+4.5	040	A8	Varies
Reach 3	430	-1.4	-0.5	+2.0	015	A3	Varies
Whitemarsh Run							
Reach 1	295,430,435	-3.0	-0.9	+3.1	030	A6	Varies
Reach 2	270,290,430	-2.6	-0.7	+3.3	025	A5	Varies
Reach 3	270	-6.6	-3.3	+5.5	065	A13	Varies
Reach 4	270	-3.5	-1.1	+3.6	035	A7	Varies
Honeygo Run							
Reach 1	290,295	-2.9	-0.9	+8.1	030	A6	Varies
Chesapeake Bay							
Reach 1	420,430,440, 445,535,555, 560	-4.3	-1.4	+2.6	045	A9	9
Reach 2	295,315,430, 435,440,445, 455,465,560	-4.8	-1.5	+2.8	050	A10	10

[1] Flood Insurance Rate Map Panel

[2] Weighted average

[3] Baltimore County Datum, rounded to nearest foot – see map

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

BALTIMORE COUNTY, MD
(UNINCORPORATED AREAS)

FLOOD INSURANCE ZONE DATA

TRIBUTARY OF STEMMERS RUN, WHITEMARSH RUN, HONEYGO RUN AND CHESAPEAKE BAY

5.3 Flood Insurance Zones

Flood insurance zones and zone numbers are assigned based on the type of flood hazard and the FHF, respectively. A unique zone number is associated with each possible FHF, and varies from 1 for a FHF of 005 to a maximum of 30 for a FHF of 200 or greater.

Zone A:	Special Flood Hazard Areas inundated by the 100-year flood, determined by approximate methods; no base flood elevations shown or FHFs determined.
Zones A1,A2,A3,A4, A5,A6,A7,A8,A9, A10,A11,A12,A13, A14,A15,A18,A21, and A23:	Special Flood Hazard Areas inundated by the 100-year flood; with base flood elevations shown, and zones subdivided according to FHFs.
Zone B:	Areas between the Special Flood Hazard Areas and the limits of the 500-year flood; areas that are protected from the 100- or 500-year floods by dike, levee, or other water control structure; areas subject to certain types of 100-year shallow flooding where depths are less than 1.0 foot; and areas subject to 100-year flooding from sources with drainage areas less than 1 square mile. Zone B is not subdivided.
Zone C:	Areas of minimal flooding; not subdivided.

Flood elevation differences, FHFs, flood insurance zones, and base flood elevations for the flooding sources studied in detail in the community are shown in Table 3.

5.4 Flood Insurance Rate Map Description

The Flood Insurance Rate Map for the unincorporated areas of Baltimore County is, for insurance purposes, the principal result of the Flood Insurance Study. This map contains the official delineation of flood insurance zones and base flood elevations. Base flood elevation lines show the locations of the expected whole-foot water-surface elevation of the base (100-year) flood. The base flood elevations and zone numbers are used by insurance agents, in conjunction with structure elevations and characteristics, to assign actuarial insurance rates to structures and contents insured under the National Flood Insurance Program.

6.0 OTHER STUDIES

In 1973, a study was published concerning flooding on Beaverdam Run from Loch Raven Reservoir to York Road (Reference 21). Information about elevations of the floods of 1933, 1956, and 1972, as well as the peak discharge estimate for the 1955 event were presented. The peak discharges for the 10-, 50-, and 100-year floods were estimated by several methods. The study report was primarily devoted to methods by which the 100-year flood elevations in the study reach could be lowered; therefore, no profiles of floods within the basin in its existing condition were presented. The 100-year peak discharge was estimated at 12,000 cubic feet per second (cfs) as determined by the Burueau of Public Road method, or 7,640 cfs using equations publihsed by the Maryland Geological Survey (References 22 and 10).

For this study, peak discharge estimates for Beaverdam Run were computed by a method developed by the Water Resources Council (Reference 5). This recently published (March 1976) method consists of equations for estimating peak discharges on streams that have experienced rare floods, such as the one created by Tropical Storm Agnes. This method was not previously in widespread use but will now be used by the several federal agencies that frequently estimate flood frequencies in place of all earlier equations

In 1975, the Soil Conservation Service (SCS) published a report on a study of flooding in the Western Run basin, including Beaverdam Run (Reference 24). No peak discharge estimates were included in the report, but profiles of the 10-, 100-, and 500-year floods of Beaverdam Run were presented. The profiles were significantly lower than those presented in this study for the 100- and 500-year floods and were generally higher than the profile presented for the 10-year flood. The difference can be attributed to the method by which the starting water-surface elevations were determined for Beaverdam Run. The SCS study based starting elevations on manual backwater computations that began at the reservoir spillway on Western Run, approximately 8 miles downstream from the confluence of Beaverdam Run. For this study, starting conditions were based upon the following data at the CONRAIL bridge over Beaverdam Run, just above its confluence with Western Run: the stream bed elevation was 239.5 feet; the peak discharge of 1956 flood was 3,950 cfs, with an elevation of 250.7 feet; and the estimated peak discharge of the 1972 flood was 9,800 cfs, with an elevation of 263.3 feet (Reference 21). These points yielded an adequate stage-discharge graph from which the elevation of any flood discharge could be estimated.

In 1974, a report was published on flooding on Roland Run between Interstate Route 695 and Morris Avenue (Reference 24). Peak-discharge estimates and a profile of the 100-year flood were presented. The peak discharges were computed by the rational method and were not confirmed by some alternative method. The computed discharges are in close agreement with those presented

in this study, ranging from exactly the same at Interstate Route 695 to 10 percent higher than the values in this study at Morris Avenue. The Bureau of Public Roads method was used for the hydraulic computations and yielded water-surface elevations from 2.5 to 4.5 feet higher in the reach just upstream from the interstate highway than the 100-year profile developed in this study (Reference 22). This is the same reach where the peak discharges are the same, or nearly so, in both studies. For the reach from Seminary Avenue to Morris Avenue, the difference in flood profiles is in the range of 0.5 foot or less. These differences in flood elevations are attributable to the hydraulic methods used. The Bureau of Public Roads method was developed primarily for determining the size of culverts, not computing the water-surface profile of a stream under specified flow conditions. The method used in this study will generate water-surface elevations that will more closely represent actual conditions.

Another study was prepared for Rolond Run in 1971 that covered flooding from Lake Roland to Essex Farm Road (Reference 16). In that report, the discharges of the 10- and 50-year floods and the profile of the 50-year flood were presented. This discharges ranged from 69 to 87 percent of the values used in this study, and the 50-year flood profile was usually from 1.5 to 3.5 feet lower than the 50-year flood profile in this study. This study reflects additional hydrologic data, which includes Tropical Storm Agnes and accounts for the higher discharge estimates.

In 1971, a report was prepared on flooding in the Dead Run drainage basin (Reference 25). The 50-year flood was the only one considered. Peak-discharge estimates in that report were lower than those developed for this study, especially in the lower end of the study reach. This is due to the increased urbanization of the lower study reach and the occurrence of two major floods in the basin since 1971.

A report on flooding on Gwynns Falls was published in 1975 (Reference 17). Both the 10- and 100-year floods were studied. For the reach from the Baltimore City corporate limits to Old Court Road, the 10-year flood peak discharges presented in that study range from 3- to 6-percent higher than those developed in this study. From that point upstream to Timber Grove Road, 10-year peak-discharge estimates in the previous report are in excess of 150 percent of those presented in this study. For the 100-year event, the previous report lists peak-discharge estimates approximately 85 percent as large as those in this study for the reach between the corporate limits and Old Court Road. For the upper reach, the 100-year values in the previous report are approximately 96 percent as large as those determined in this study. The profiles and flood boundaries developed in the previous report are different from the ones in this study by approximately the same amount as the discharges. From Timber Grove Road usptream, it was felt that the dishcarges and resulting flood boundaries in the previous study more accurately depicted

the flooding in that area and, therefore, were adopted for this study. The differences occur because a different method for determining the peak discharges was used in each study. In the previous report, peak dischrges were developed on the basis of synthetic runoff hydrographs for varioius points along the stream; existing discharge data were ignored. The syntheitic hydrographs were then refined to make them agree as closely as possible with known flood conditions (in this case, a series of 1972 flood high-water marks). However, the final hydrographs ranged from 3.5 feet lower to 2.0 feet higher than the known high-water marks. Also, the peak discharge at the Villa Nova gage was computed as 18,950 cfs in the modeled 1972 flood; whereas, the estimated peak discharge at the gage was 16,200 cfs. In this study, peak discharges were estimeated using existing stream flow data from the gages at Villa Nova and near Owings Mills; flood elevations were computed using the HEC-2 computer program (11).

An analysis of flooding on Stemmers Run was also published in 1975 (Reference 26). Because that report was based on data available only through 1971, the effects of the floods created by Tropical Storms Agnes and Eloise on discharge estimates were not included. This is especially evident in the lower reaches of Stemmers Run, where the 100-year flood elevation at the CONRAIL bridge is approximately 5 feet lower than the 100-year flood elevation in this study. From U. S. Route 40 upstream, the 100-year flood profiles do not vary by more than 0.5 foot, with the profile in this study being higher.

Following the storm of August 1, 1971, a study was prepared on how certain improvements (new major roads, dwellings, and businesses) being considered for the Whitemarsh Run basin would affect flooding from Ebenezer Road to a point approximately halfway between Interstate Route 95 and U. S. Route 1 (Reference 27). In that study, profiles of the 50- and 100-year floods were presented, as well as hydrographs of each flood at various points along the study reach. Since the results were not based on existing conditions, comparison with the results of this study is not possible.

A Flood Insurance Study for the City of Baltimore is currently being prepared (Reference 12). The results of that study will be in agreement with the results of this study except on Gwynns Falls. The base flood elevation (100-year flood elevation) at the county boundary is 2 feet higher in this study than in the city study. The City of Baltimore study uses more current data since Gwynns Falls was not updated in this study.

Flood Insurance Studies have been prepared for the following communities: the Borough of New Freedom; the Townships of Hopewell, Shrewsbury, and Cadorus; and the unincorporated areas of Harford, Carroll, Howard, Anne Arundel, and Kent Counties (References 28, 29, 30, 31, 32, 33, 34, 35, and 36). The results of the approximate flooding on Beetree Creek do not agree between this study and the New Freedom study. This study does not agree with the

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Shrewsbury study, because there are approximate flood boundaries shown in this study that are not shown in the Shrewsbury study. This study does not agree with the Carroll County study along Murphy Run, which was studied by detailed methods in the Carroll County study and by approximate methods in this study; there are also several approximate streams that do not match between the two studies. This study does not agree with the Kent County study since the Kent County study has V Zones (coastal high hazard areas) and this study does not. The results of the this study are in complete agreement with the results of the remaining studies.

7.0 LOCATION OF DATA

Information concerning the pertinent data used in preparation of this study can be obtained by contacting the Natural and Technological Hazards Division, Federal Emergency Management Agency, Regional Director, Region III Office, Liberty Square Building (Second Floor), 105 South Seventh Street, Philadelphia, Pennsylvania 19106.

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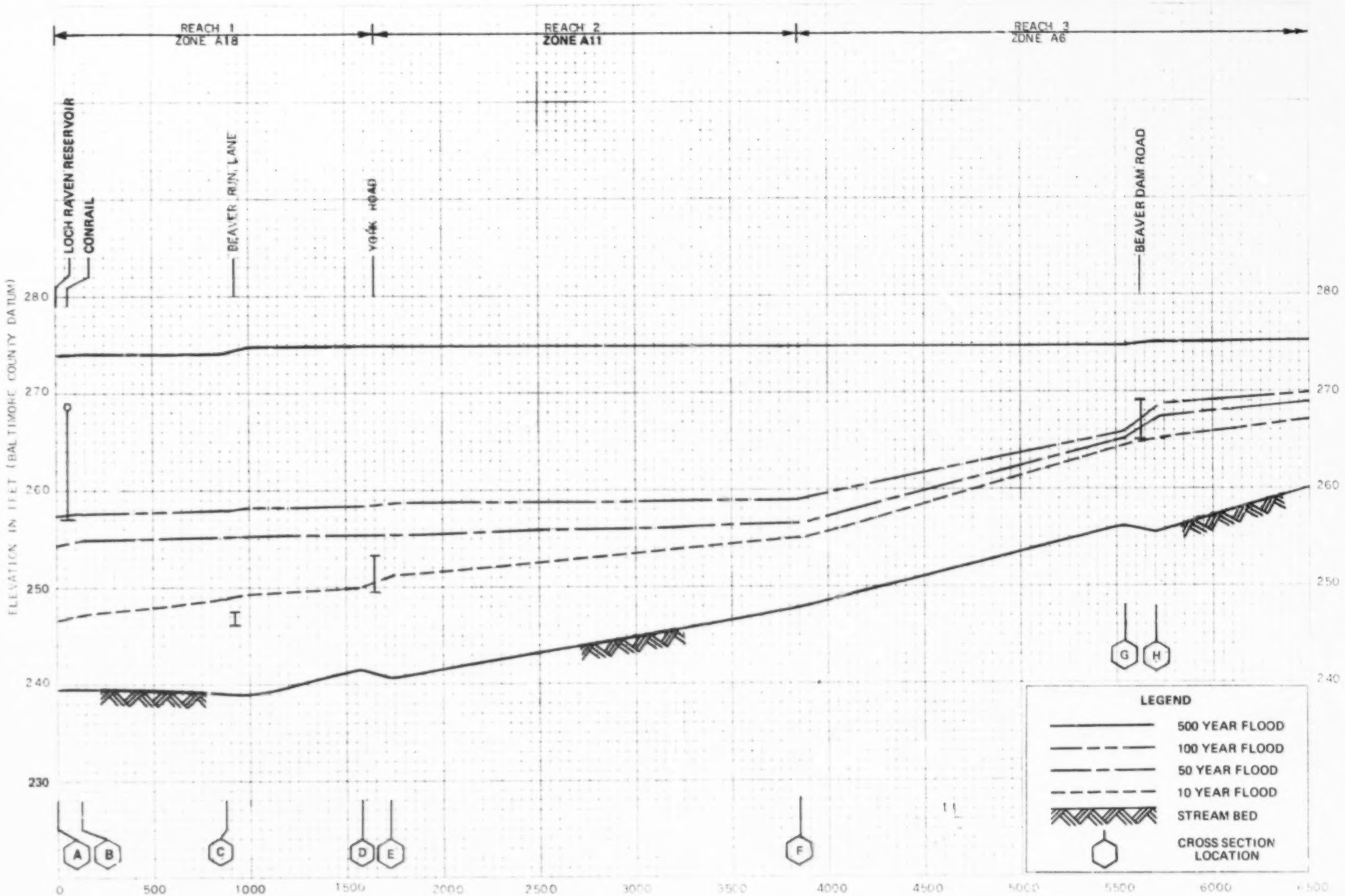

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FLOOD PROFILES

BEAVERDAM RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

BALTIMORE COUNTY, MD
(UNINCORPORATED AREAS)

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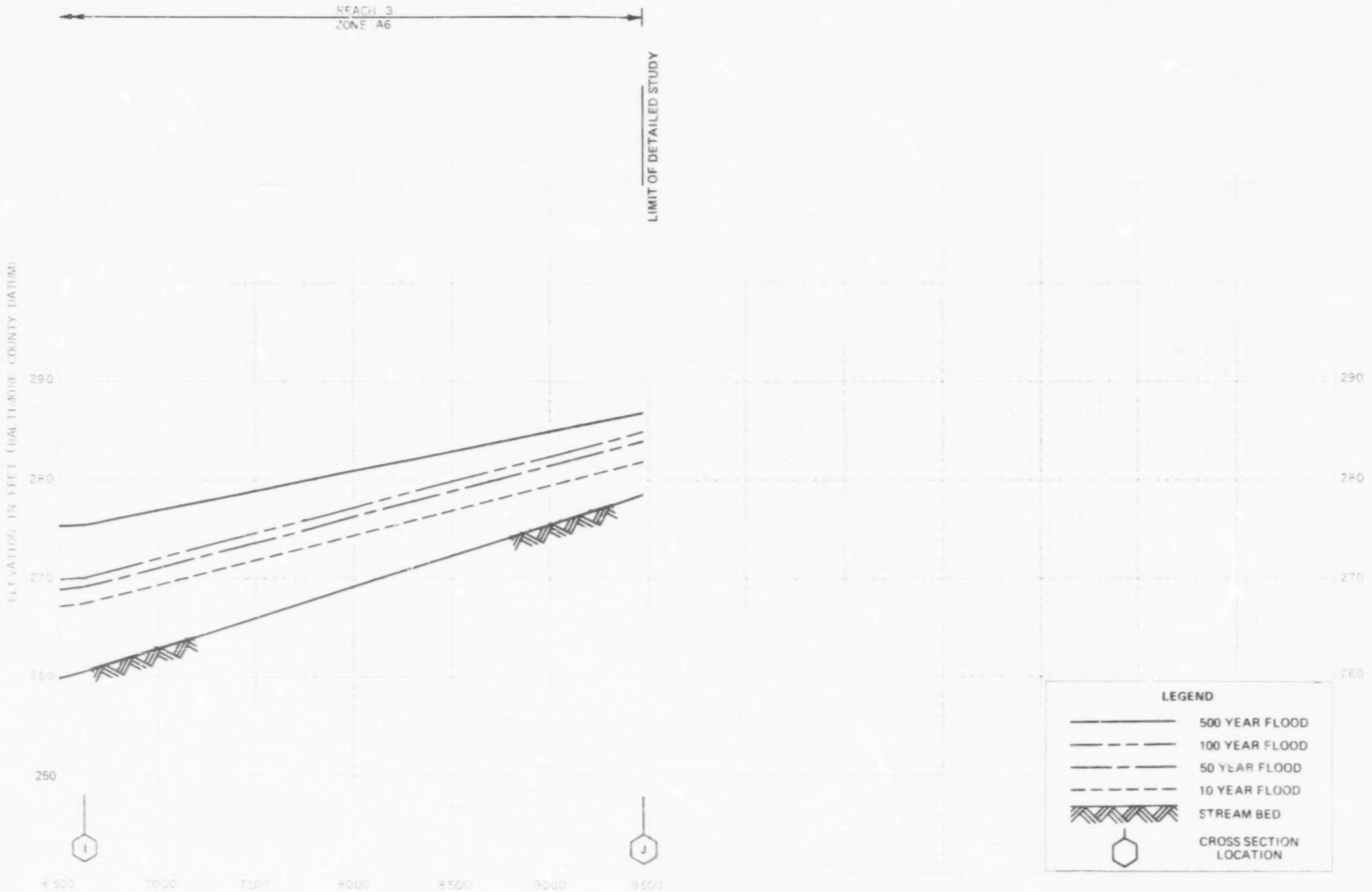

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FLOOD PROFILES

BEAVERDAM RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

BALTIMORE COUNTY, MD
(UNINCORPORATED AREAS)

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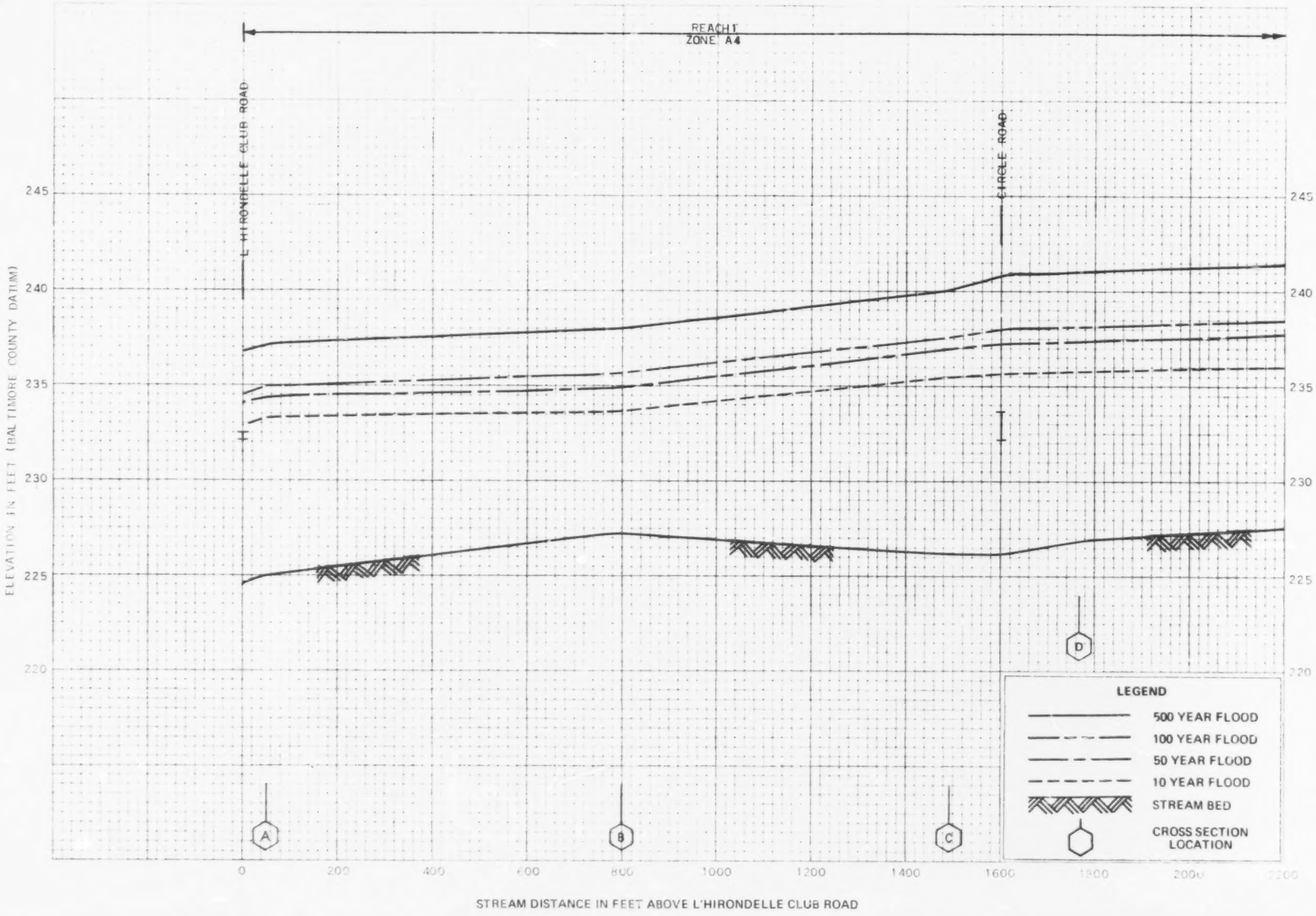

FLOOD PROFILES

ROLAND RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

BALTIMORE COUNTY, MD

(UNINCORPORATED AREAS)

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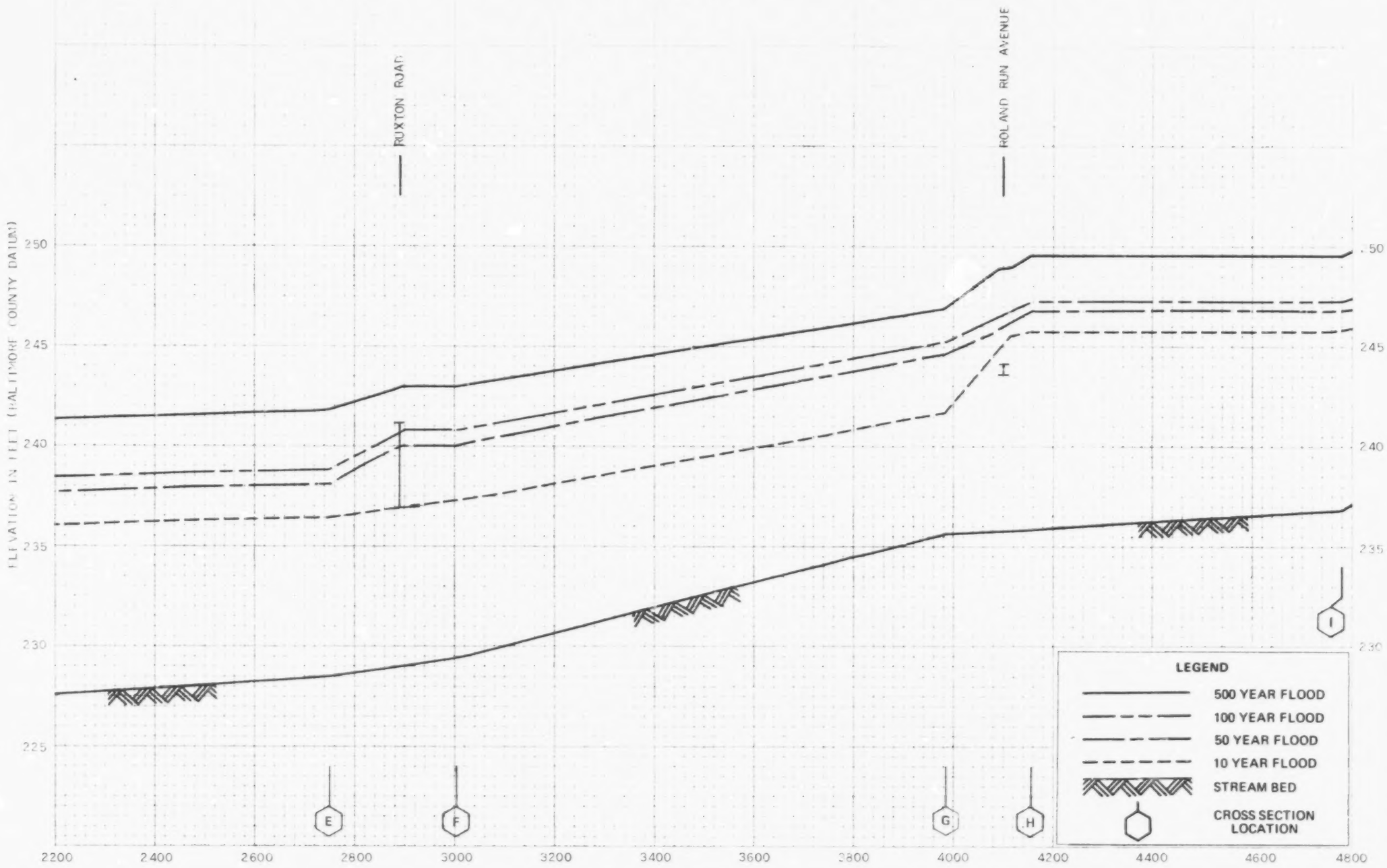
ZONE A4



STREAM DISTANCE IN FEET ABOVE L'HIRONDELLE CLUB ROAD

FLOOD PROFILES

ROLAND RUN

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BALTIMORE COUNTY, MD
(UNINCORPORATED AREAS)

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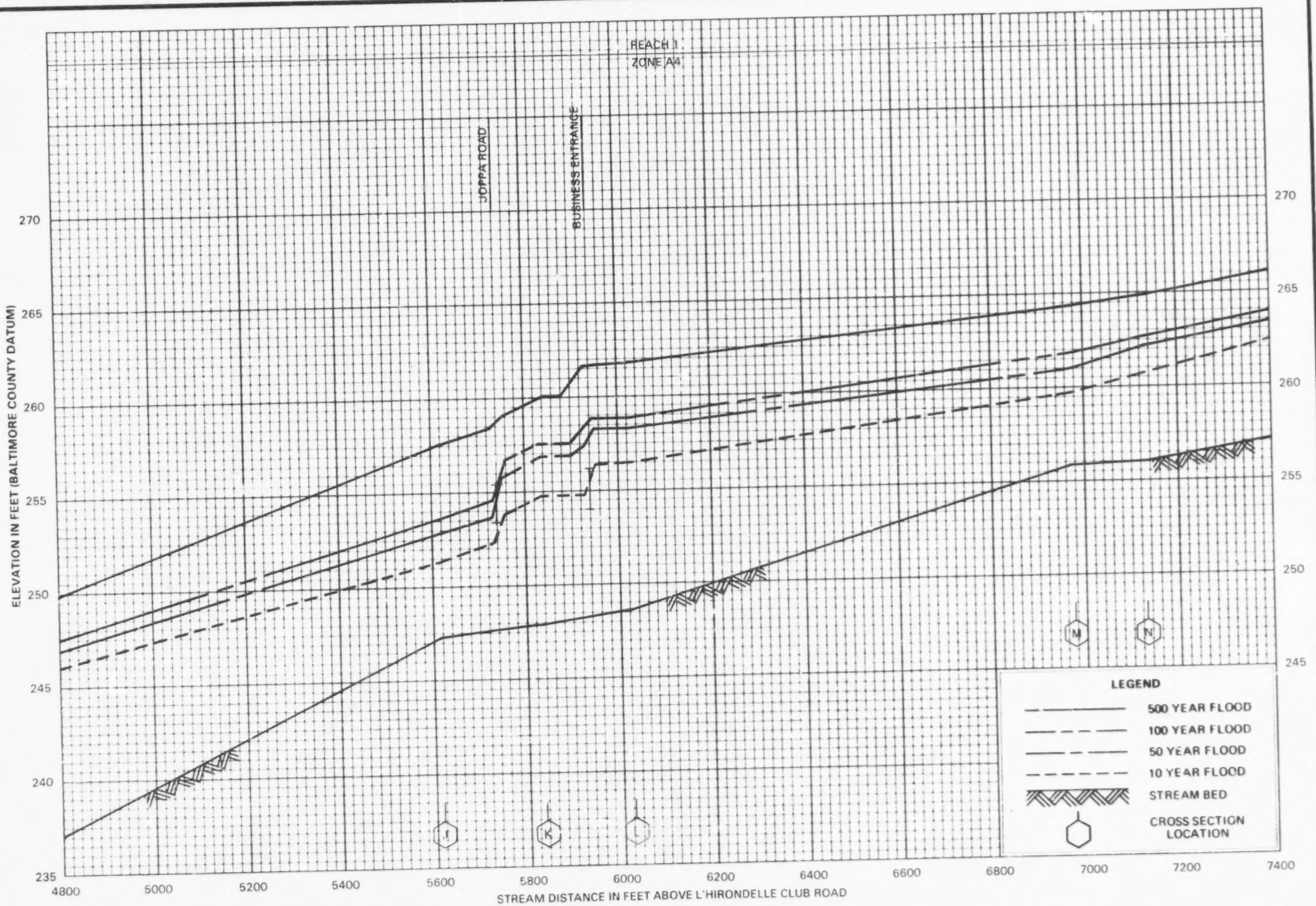

FLOOD PROFILES

ROLAND RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY

BALTIMORE COUNTY, MD

(UNINCORPORATED AREAS)

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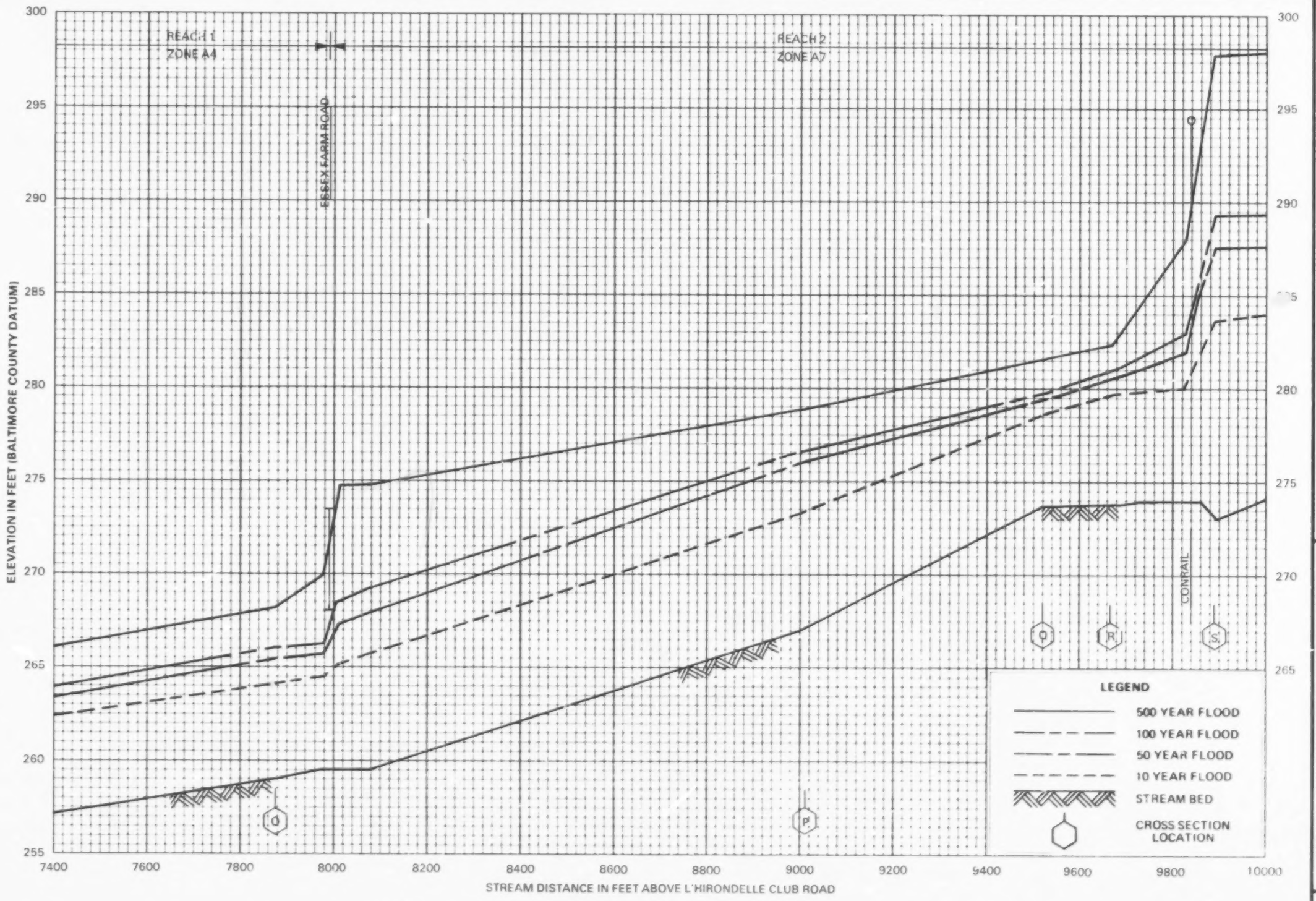

FLOOD PROFILES

ROLAND RUN

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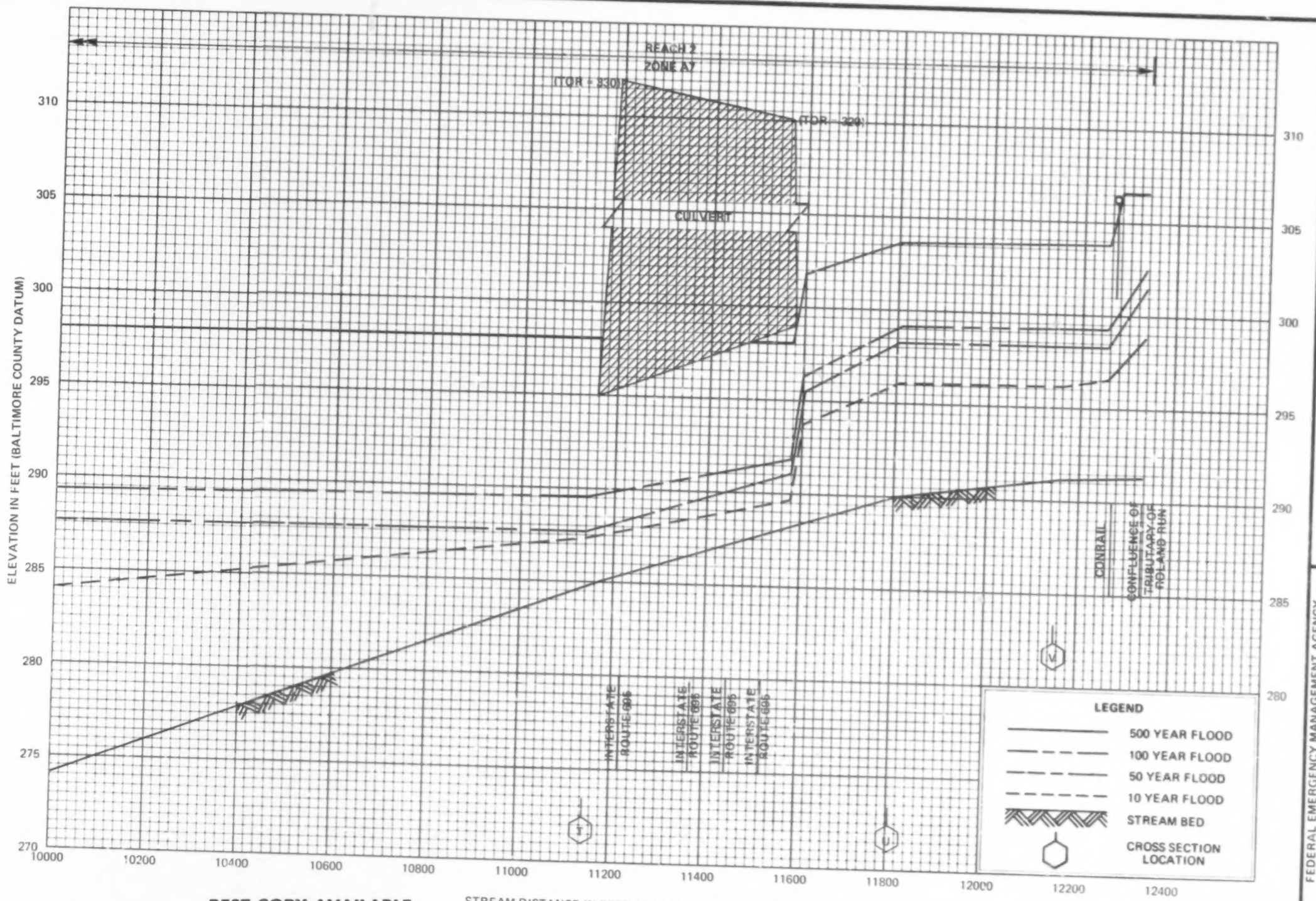

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FLOOD PROFILES

ROLAND RUN

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BALTIMORE COUNTY, MD
(UNINCORPORATED AREAS)

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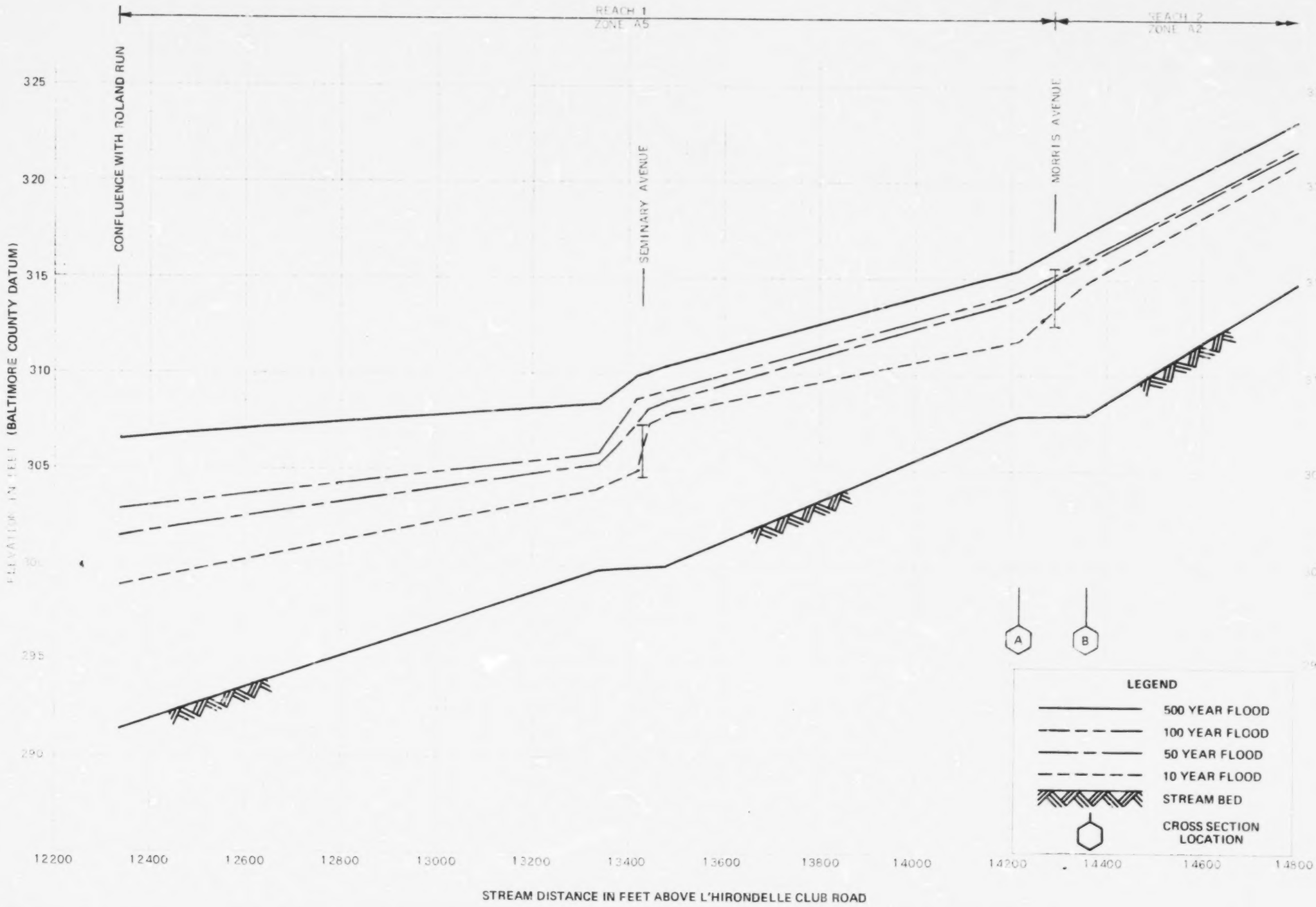

FLOOD PROFILES

TRIBUTARY OF ROLAND RUN

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BALTIMORE COUNTY, MD
(UNINCORPORATED AREAS)

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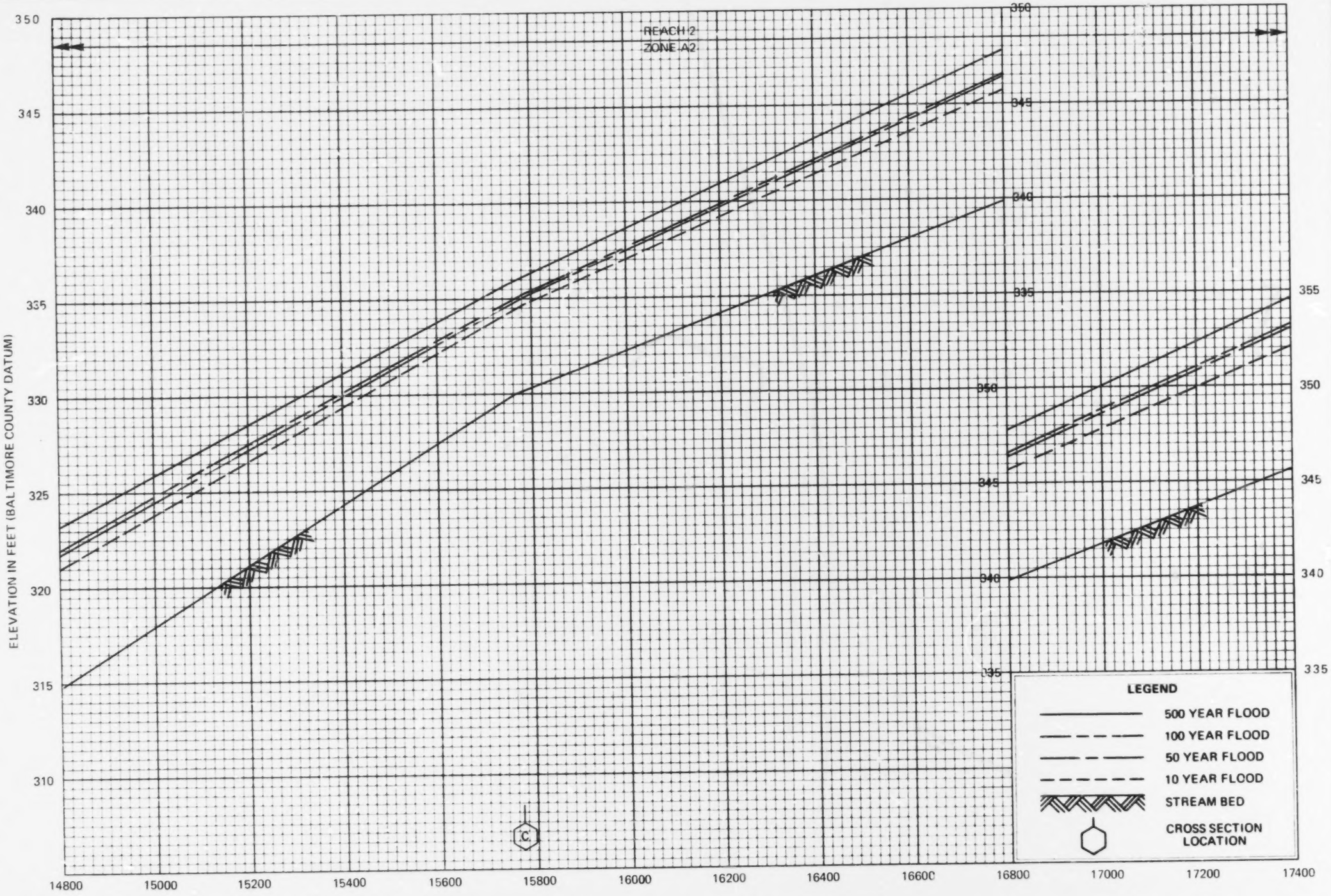

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BALTIMORE COUNTY, MD
(UNINCORPORATED AREAS)

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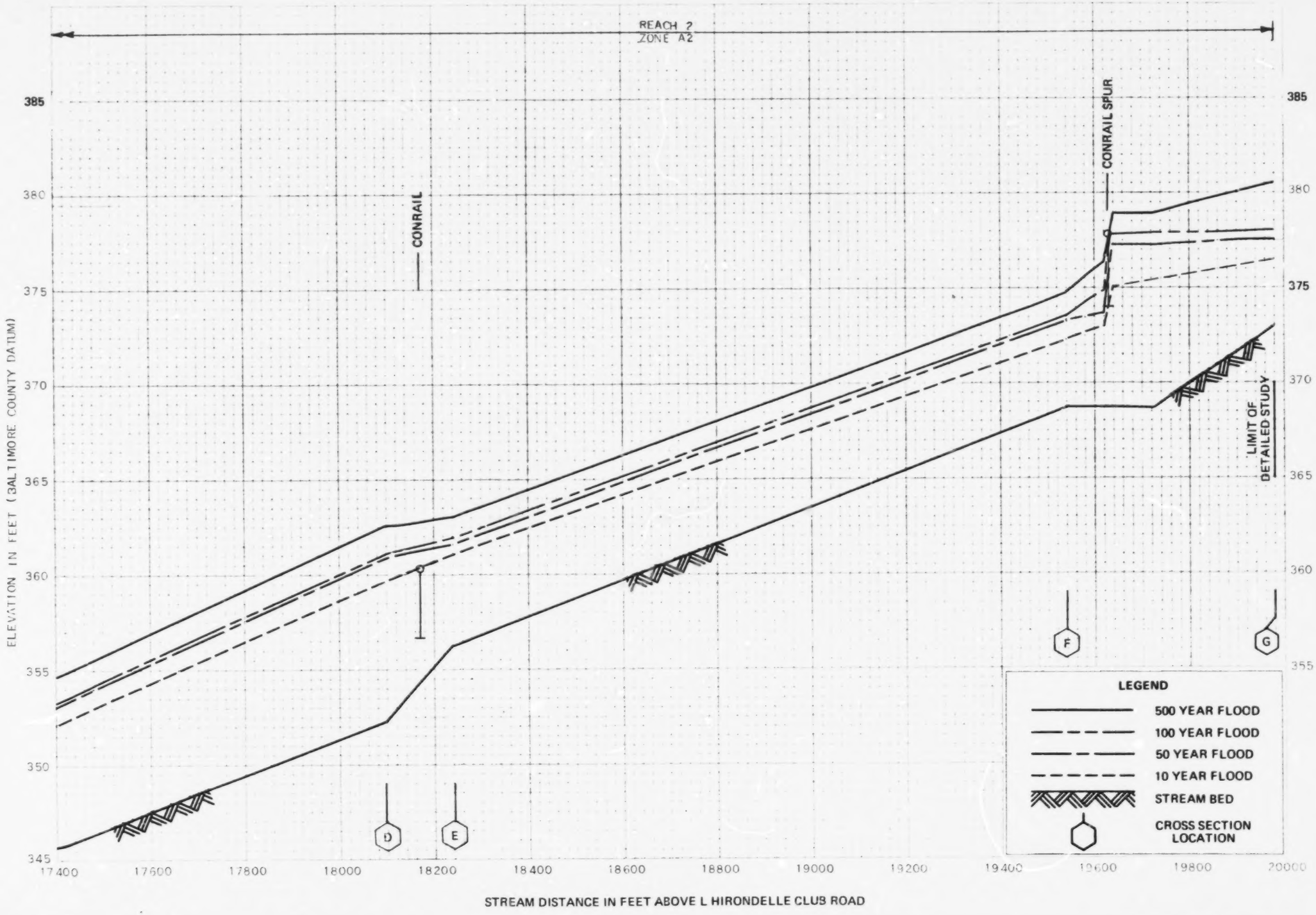

FLOOD PROFILES

TRIBUTARY OF ROLAND RUN

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BALTIMORE COUNTY, MD
(UNINCORPORATED AREAS)

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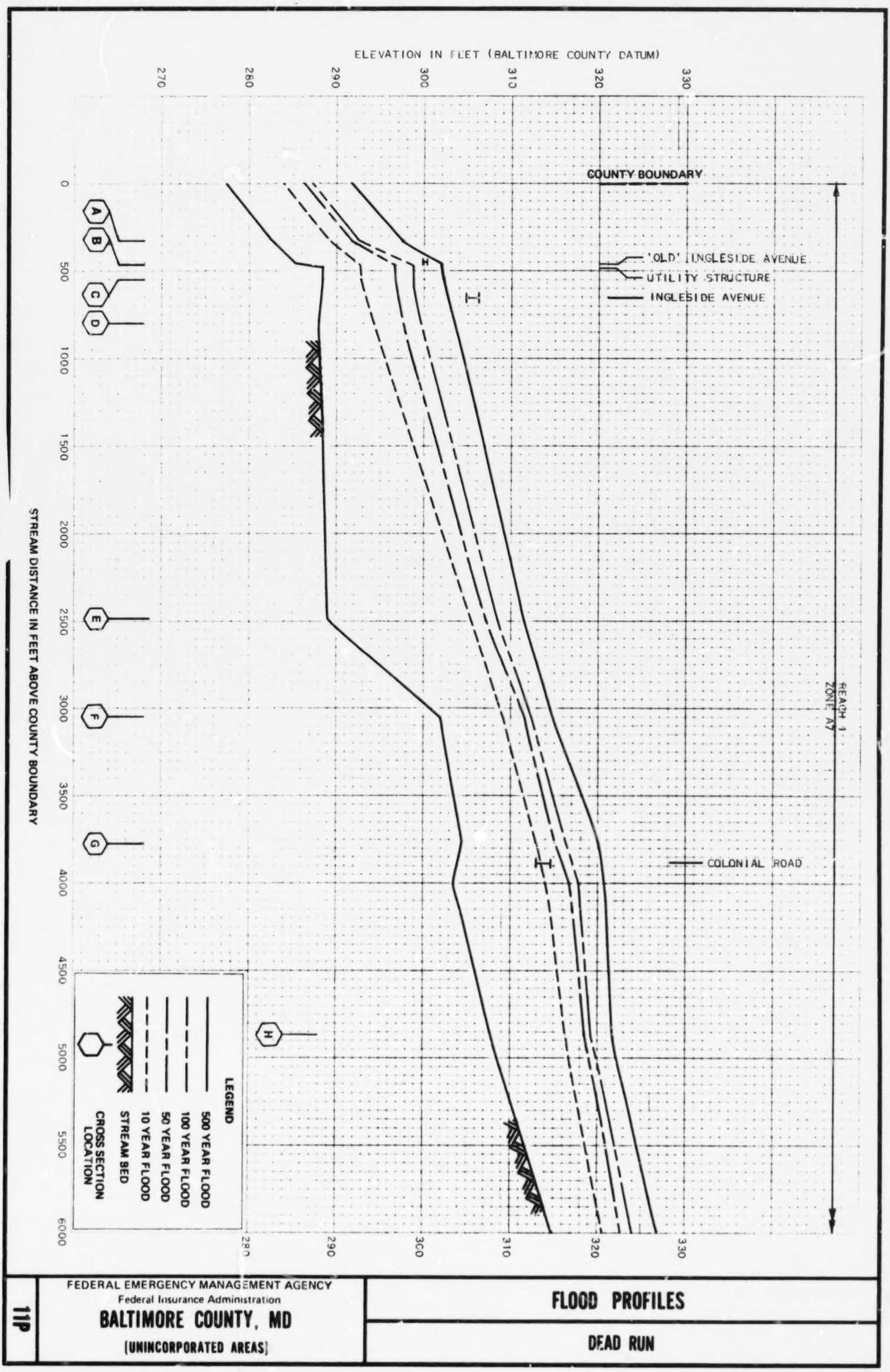

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FLOOD PROFILES

DEAD RUN

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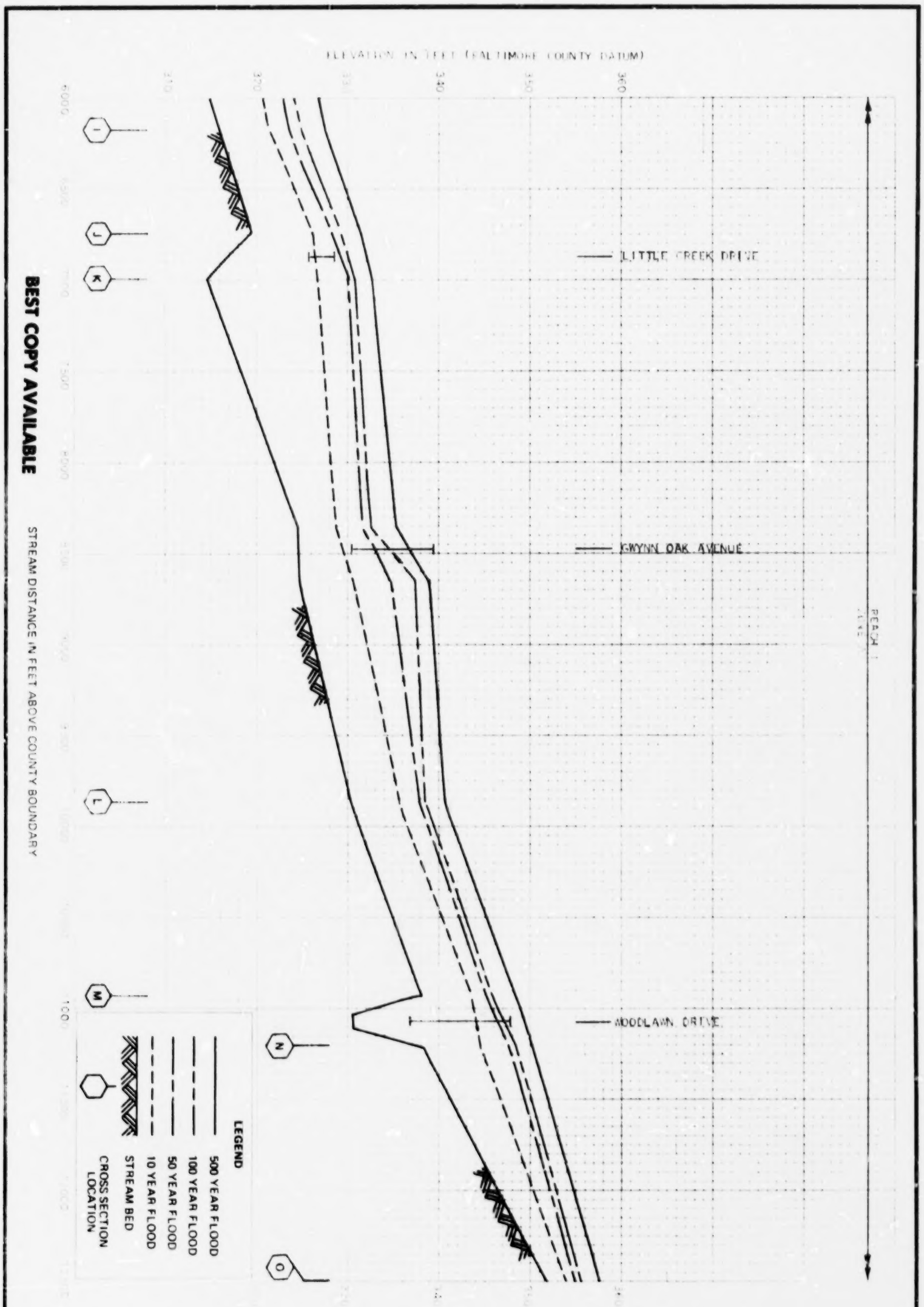

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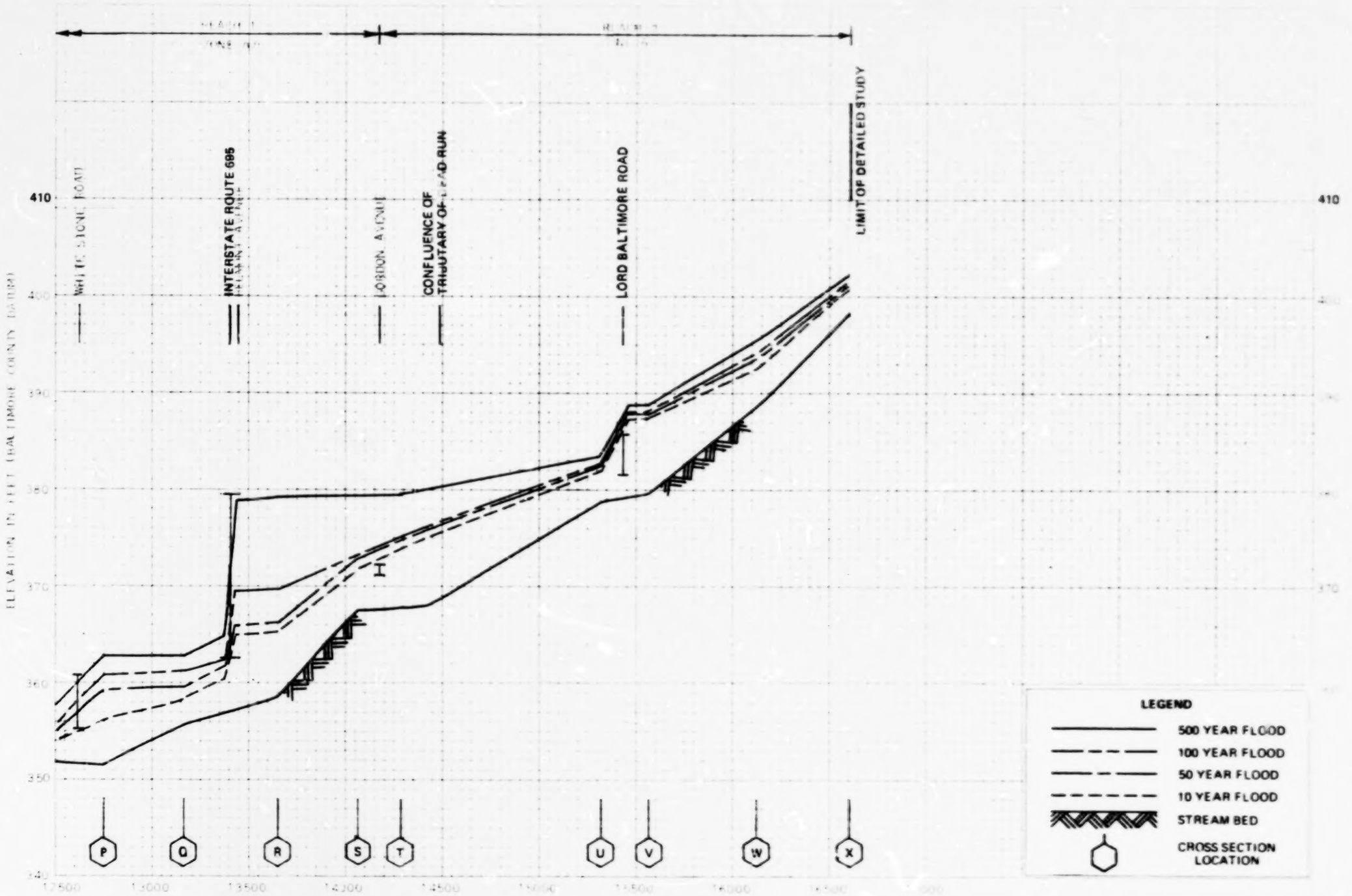

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FLOOD PROFILES

DEAD RUN

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(UNINCORPORATED AREAS)

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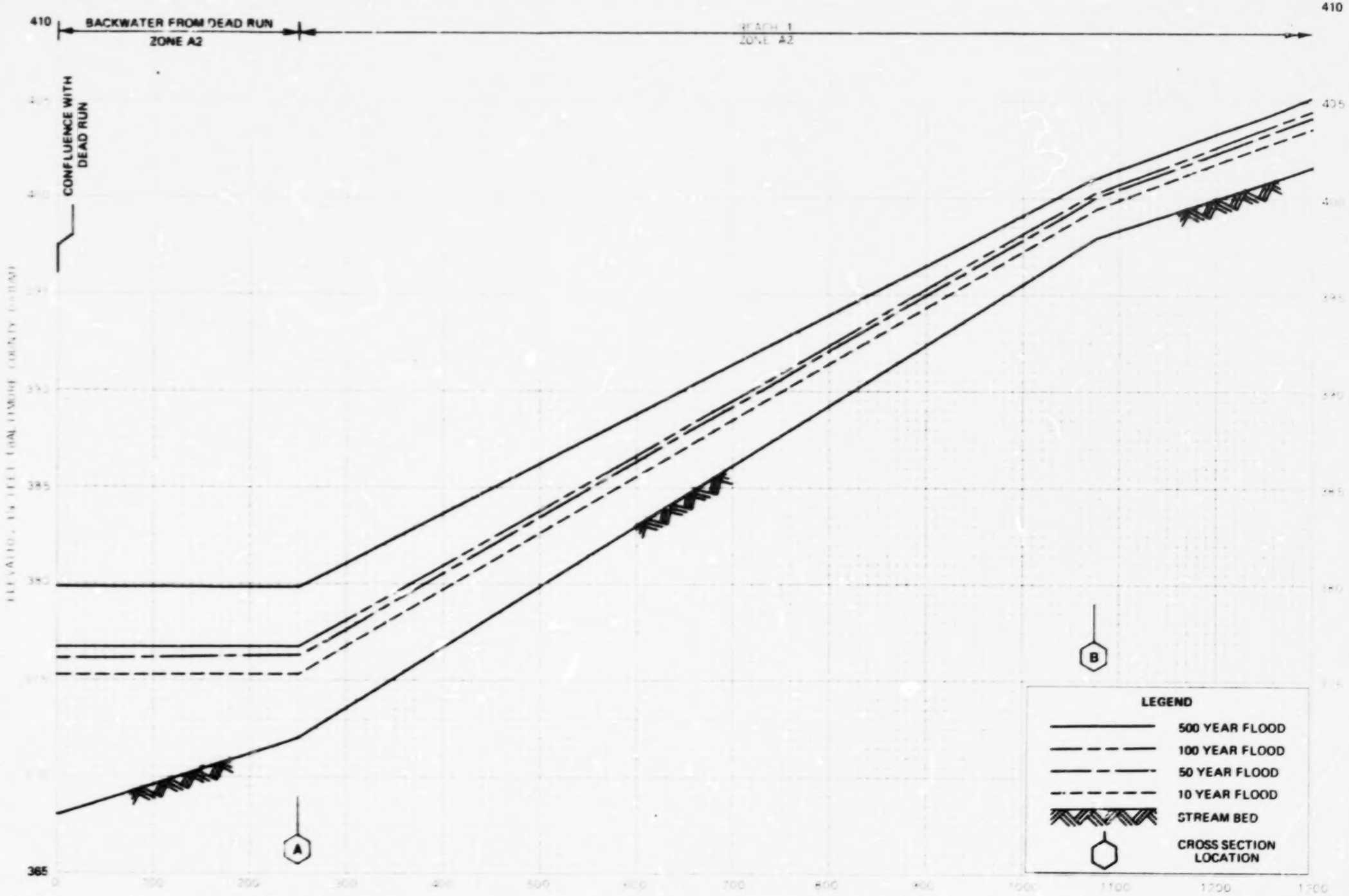

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FLOOD PROFILES

TRIBUTARY OF DEAD RUN

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BALTIMORE COUNTY, MD
(UNINCORPORATED AREAS)

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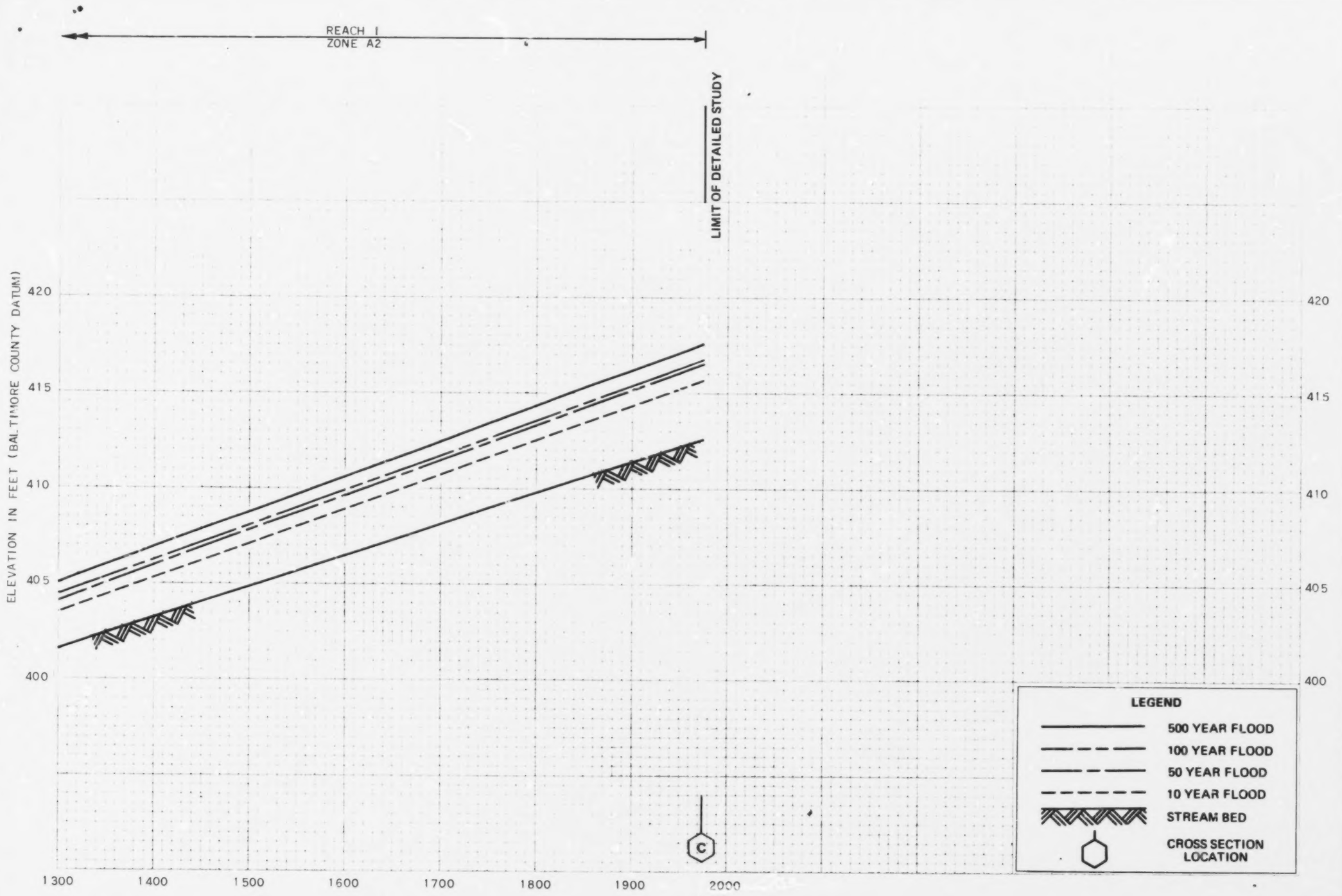

FLOOD PROFILES

TRIBUTARY OF DEAD RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

BALTIMORE COUNTY, MD
(UNINCORPORATED AREAS)

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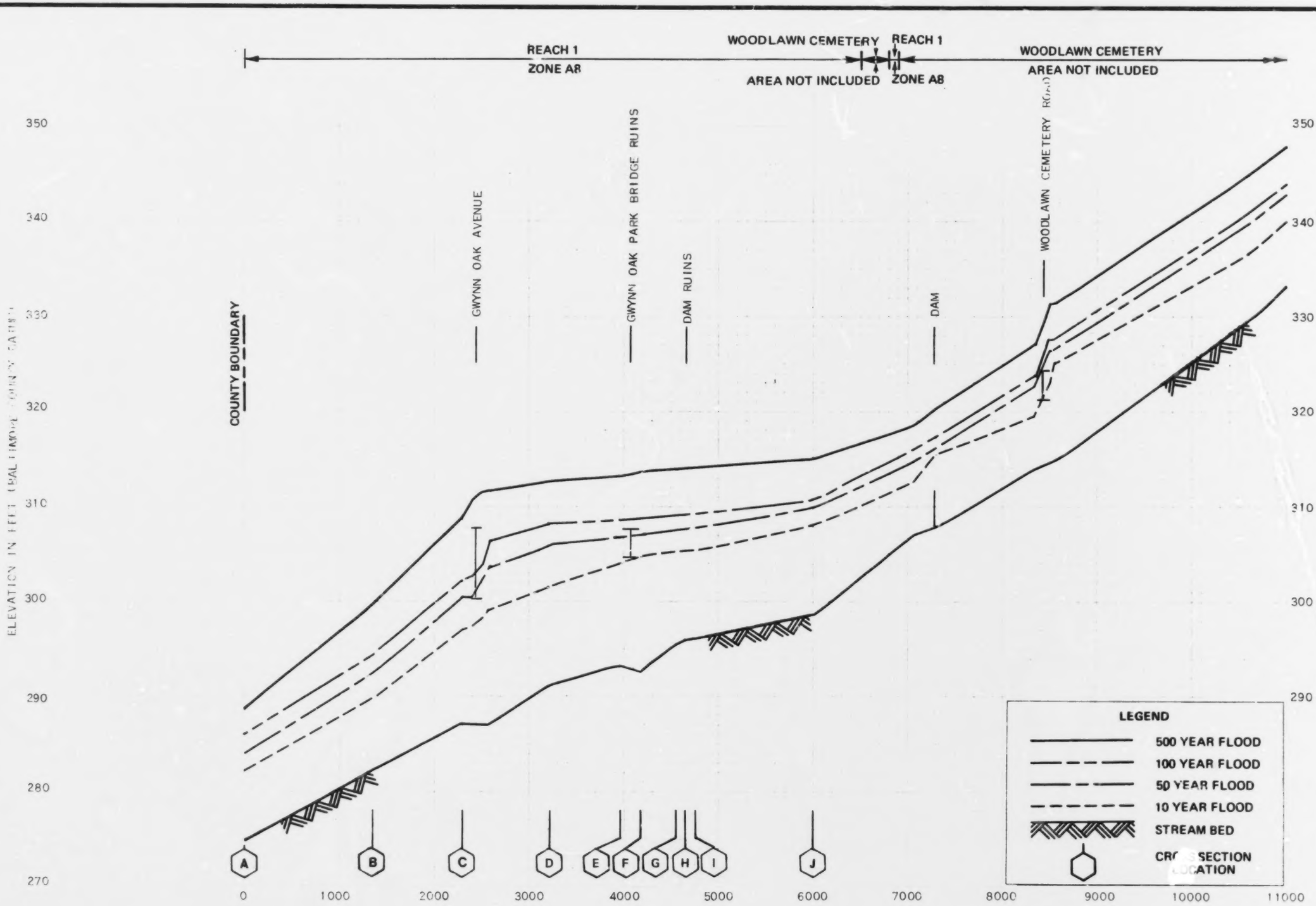

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FLOOD PROFILES

GWYNNS FALLS

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

BALTIMORE COUNTY, MD

(UNINCORPORATED AREAS)

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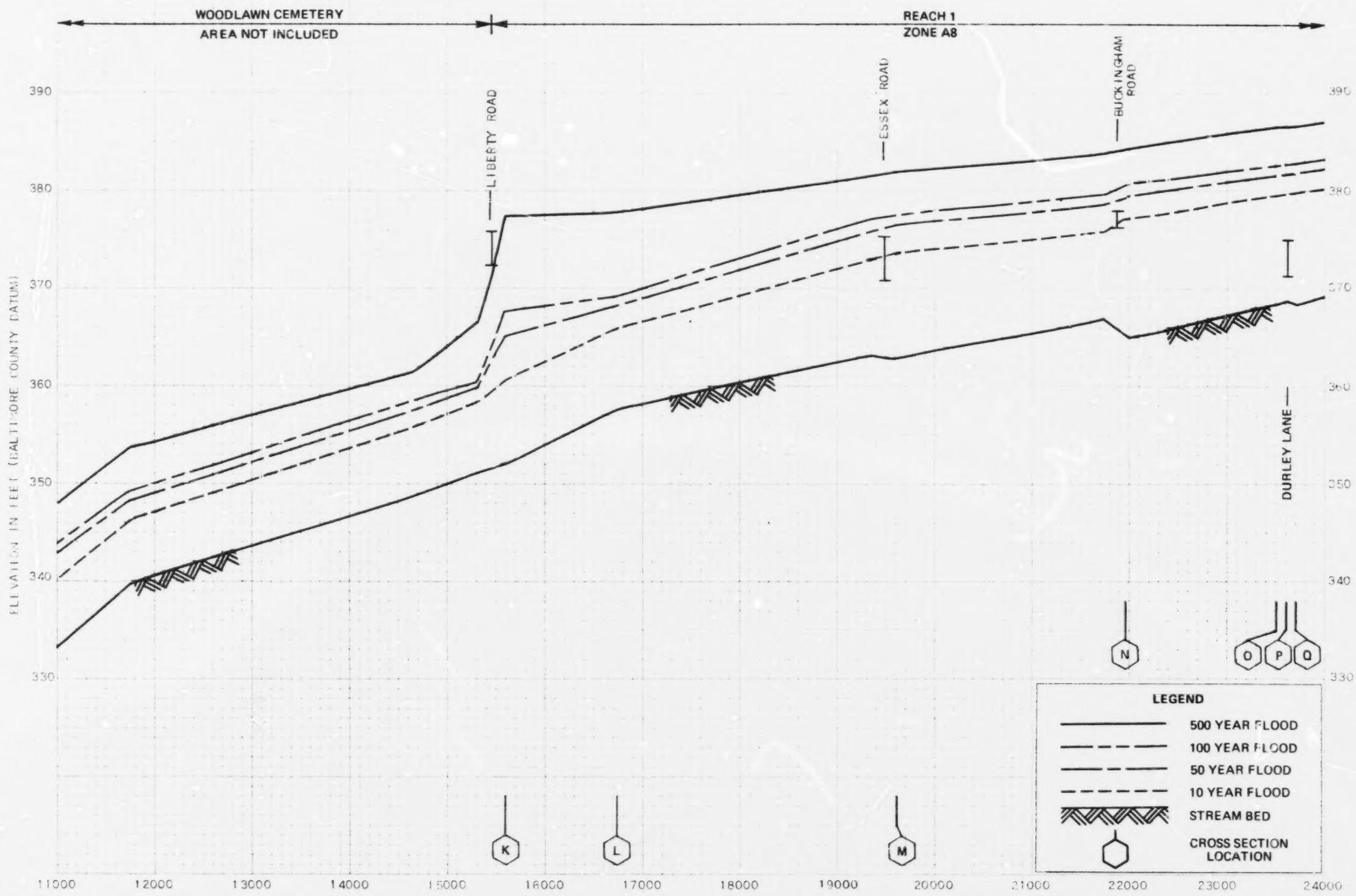

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FLOOD PROFILES

GWYNNS FALLS

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

BALTIMORE COUNTY, MD

(UNINCORPORATED AREAS)

17P

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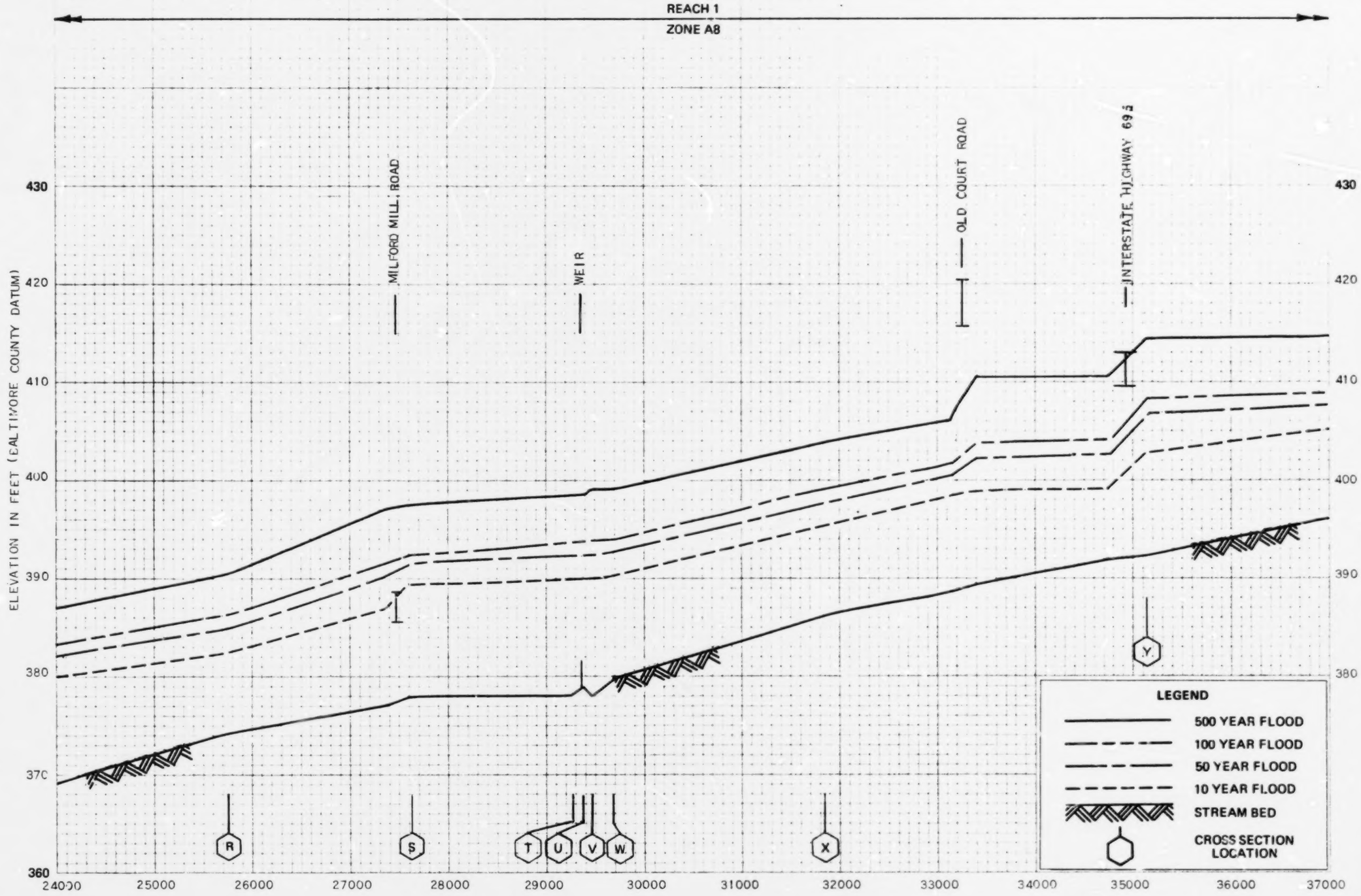

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FLOOD PROFILES

GWYNNS FALLS

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Federal Insurance Administration
BALTIMORE COUNTY, MD
(UNINCORPORATED AREAS)

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REACH 1
ZONE A8

REACH 2
ZONE A7

REACH 3
ZONE A3

MT. WILSON LANE
BRIDGE RUINS
PRIVATE ROAD
MC DONOGH ROAD

ELEVATION IN FEET (BALTIMORE COUNTY DATUM)

450
440
430
420
410
400
390

Z AA AB AC AD AE AF AG AH

37000 38000 39000 40000 41000 42000 43000 44000 45000 46000 47000 48000 49000 50000

STREAM DISTANCE IN FEET ABOVE COUNTY BOUNDARY

AI

LEGEND
- 500 YEAR FLOOD
- 100 YEAR FLOOD
- 50 YEAR FLOOD
- 10 YEAR FLOOD
- STREAM BED
- CROSS SECTION LOCATION

FLOOD PROFILES

GWYNNS FALLS

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration
BALTIMORE COUNTY, MD
(UNINCORPORATED AREAS)

19P

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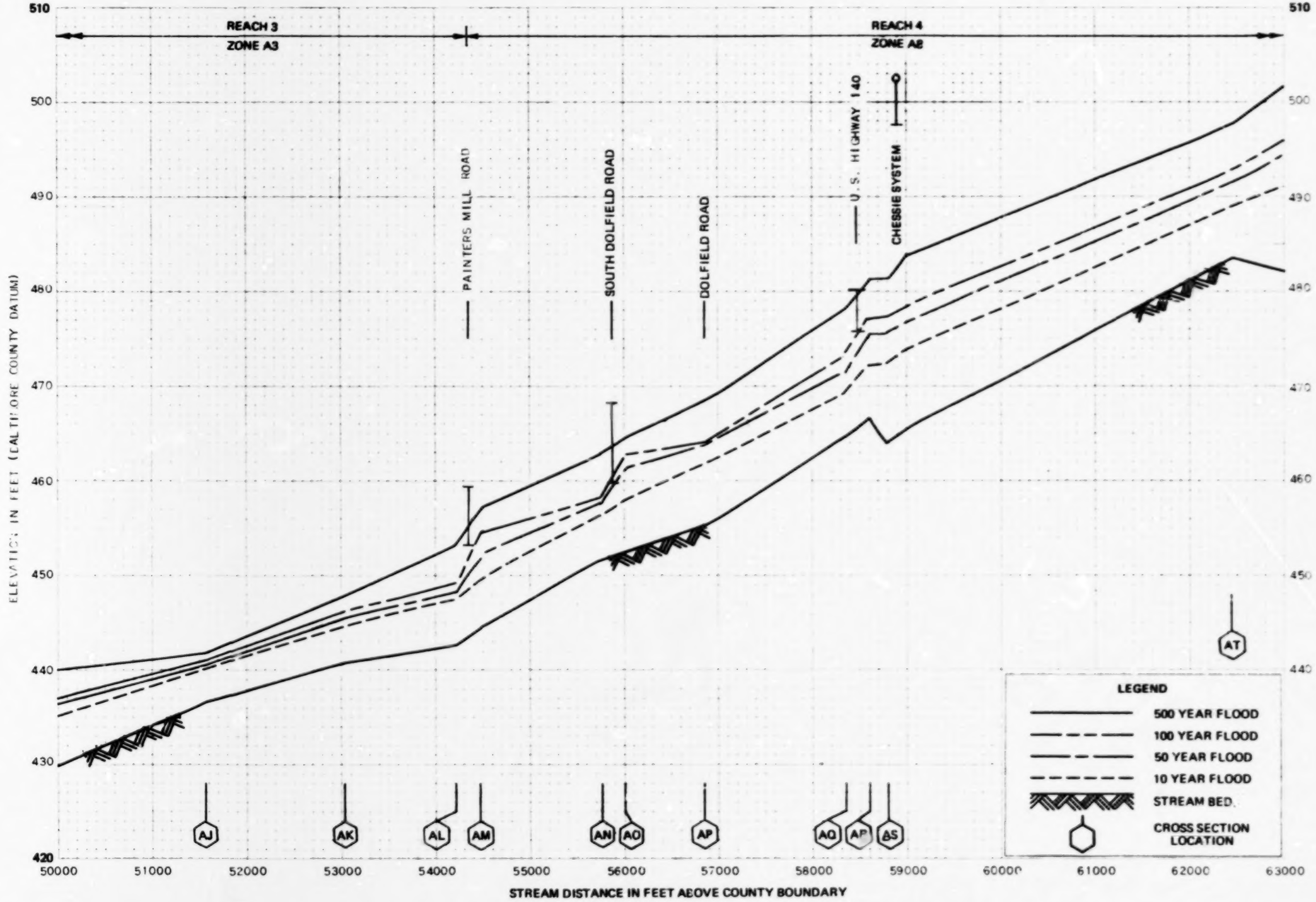

FLOOD PROFILES

GWYNNS FALLS

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

BALTIMORE COUNTY, MD
(UNINCORPORATED AREAS)

20P

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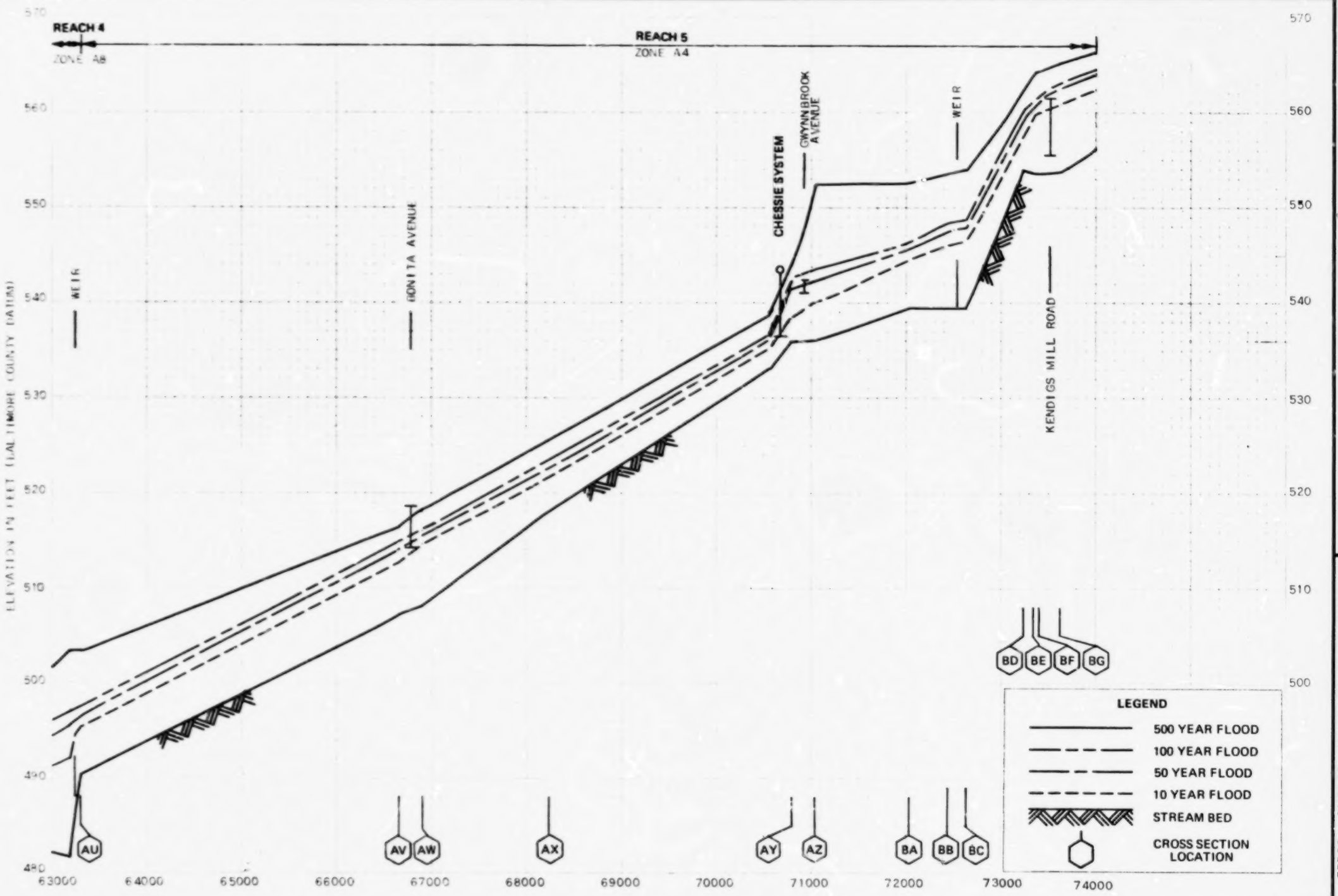

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FLOOD PROFILES

GWYNNS FALLS

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

BALTIMORE COUNTY, MD
(UNINCORPORATED AREAS)

21P

70

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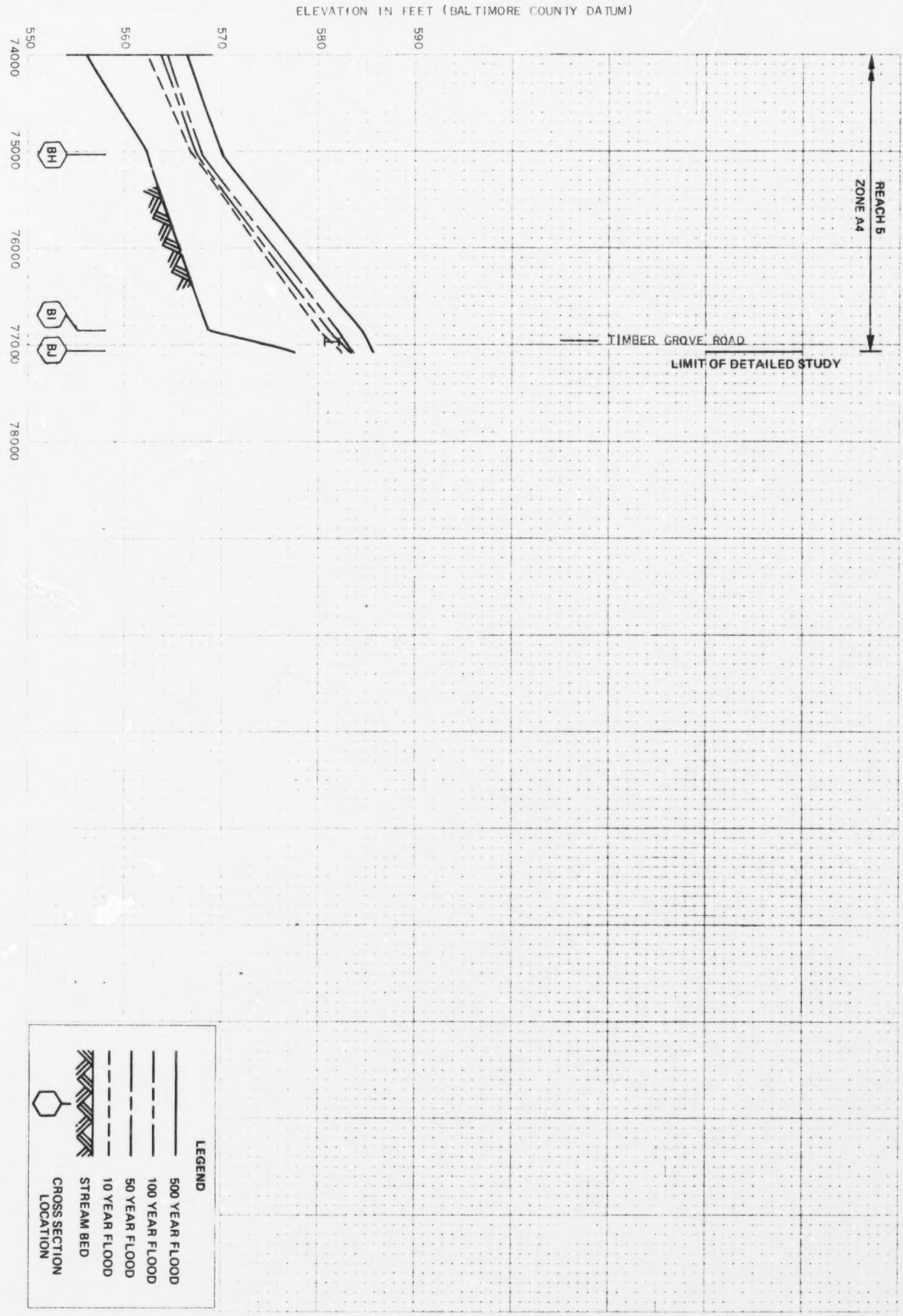
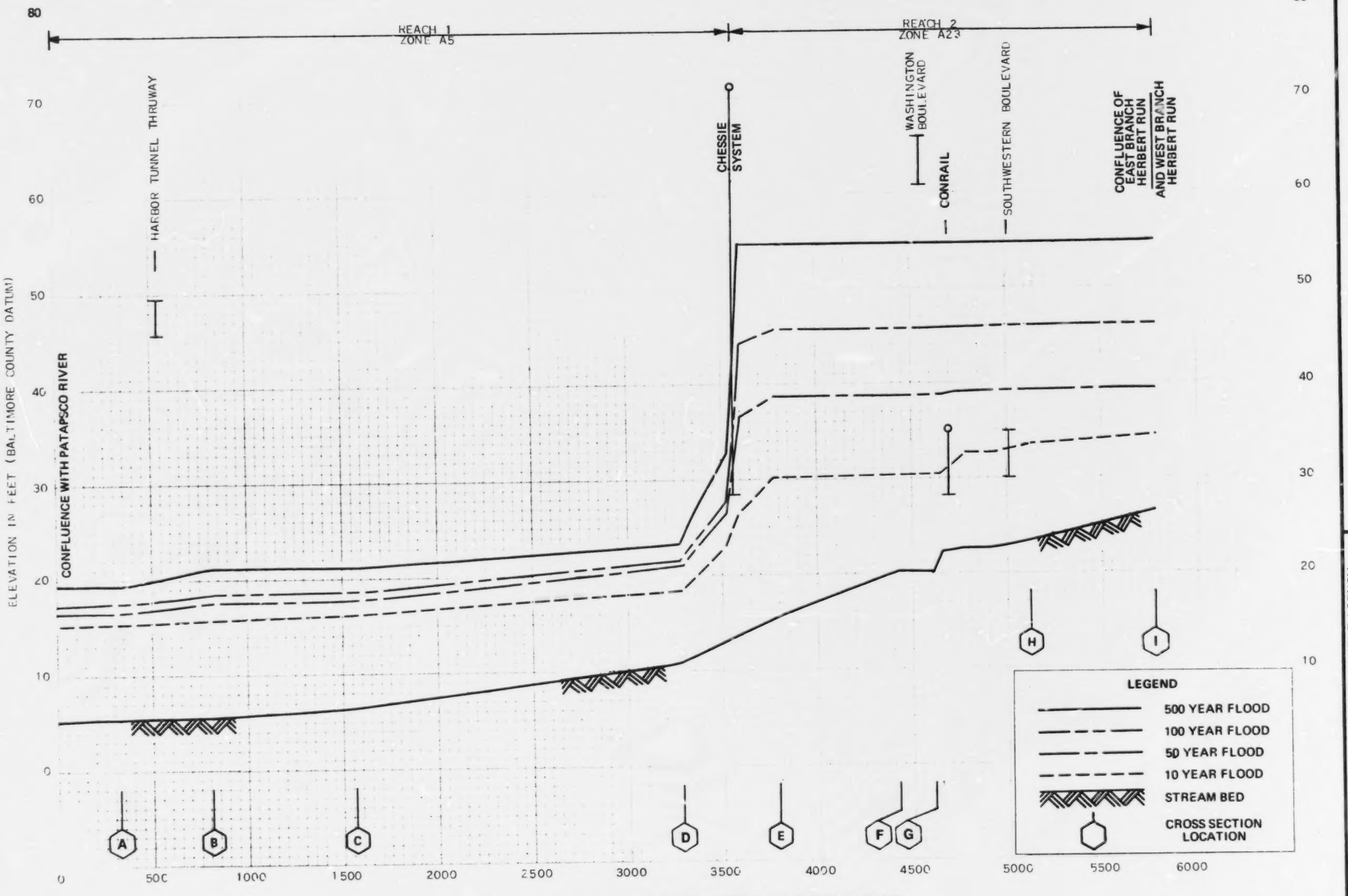


22P	FEDERAL EMERGENCY MANAGEMENT AGENCY Federal Insurance Administration **BALTIMORE COUNTY, MD** (UNINCORPORATED AREAS)	**FLOOD PROFILES** **GWYNNS FALLS**



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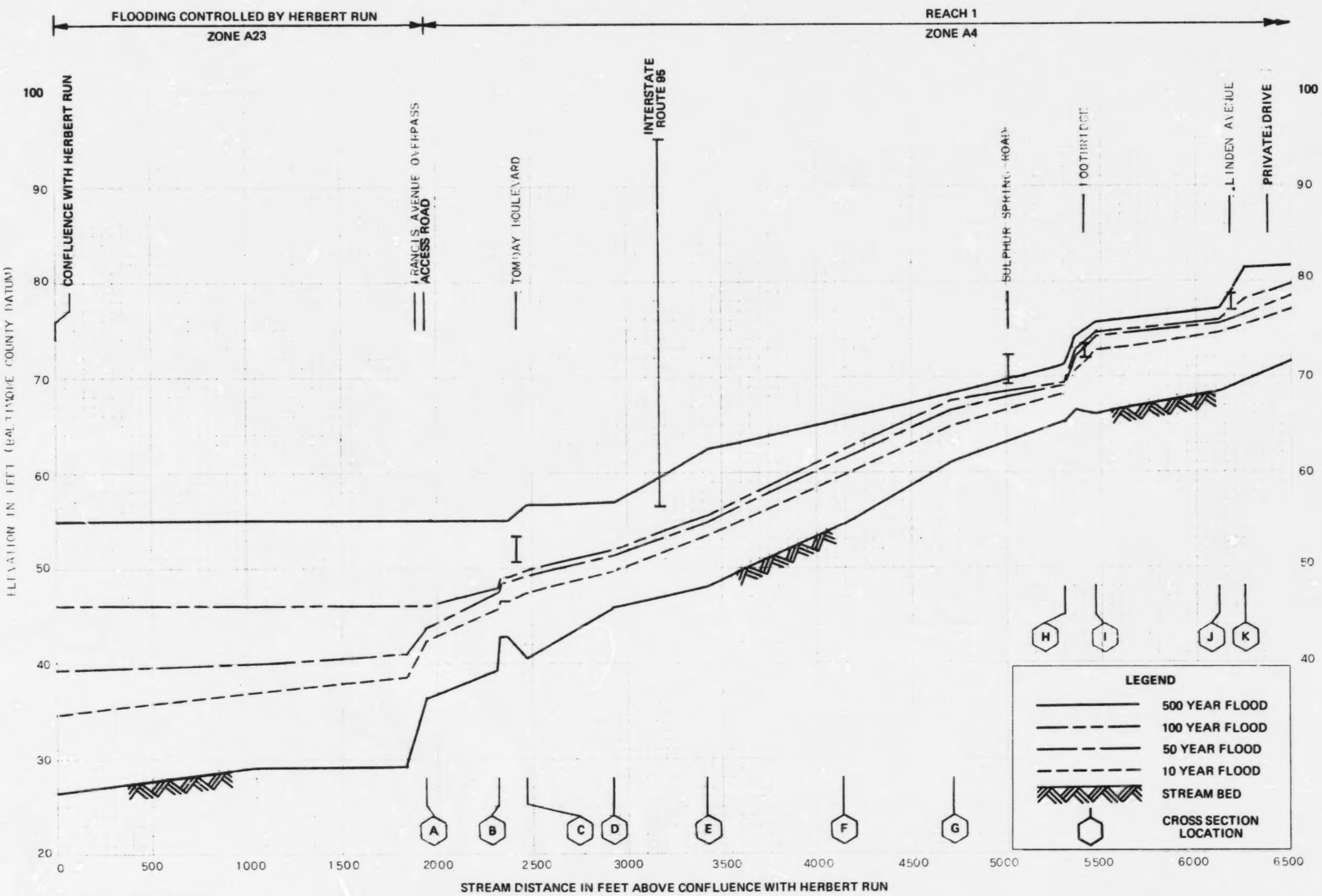
FLOOD PROFILES

HERBERT RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration
BALTIMORE COUNTY, MD
(UNINCORPORATED AREAS)

23P



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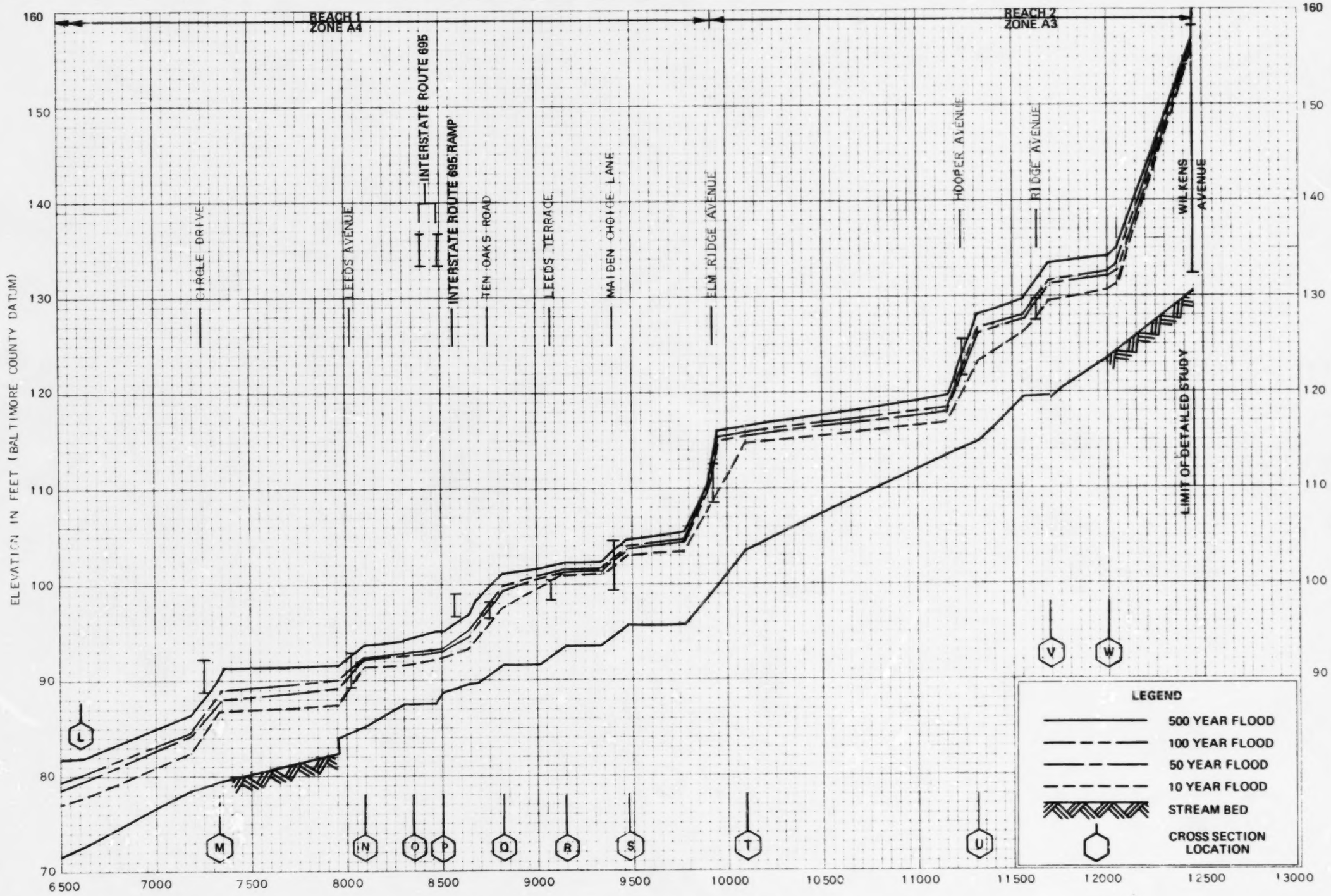
FLOOD PROFILES

EAST BRANCH HERBERT RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

BALTIMORE COUNTY, MD
(UNINCORPORATED AREAS)

24P



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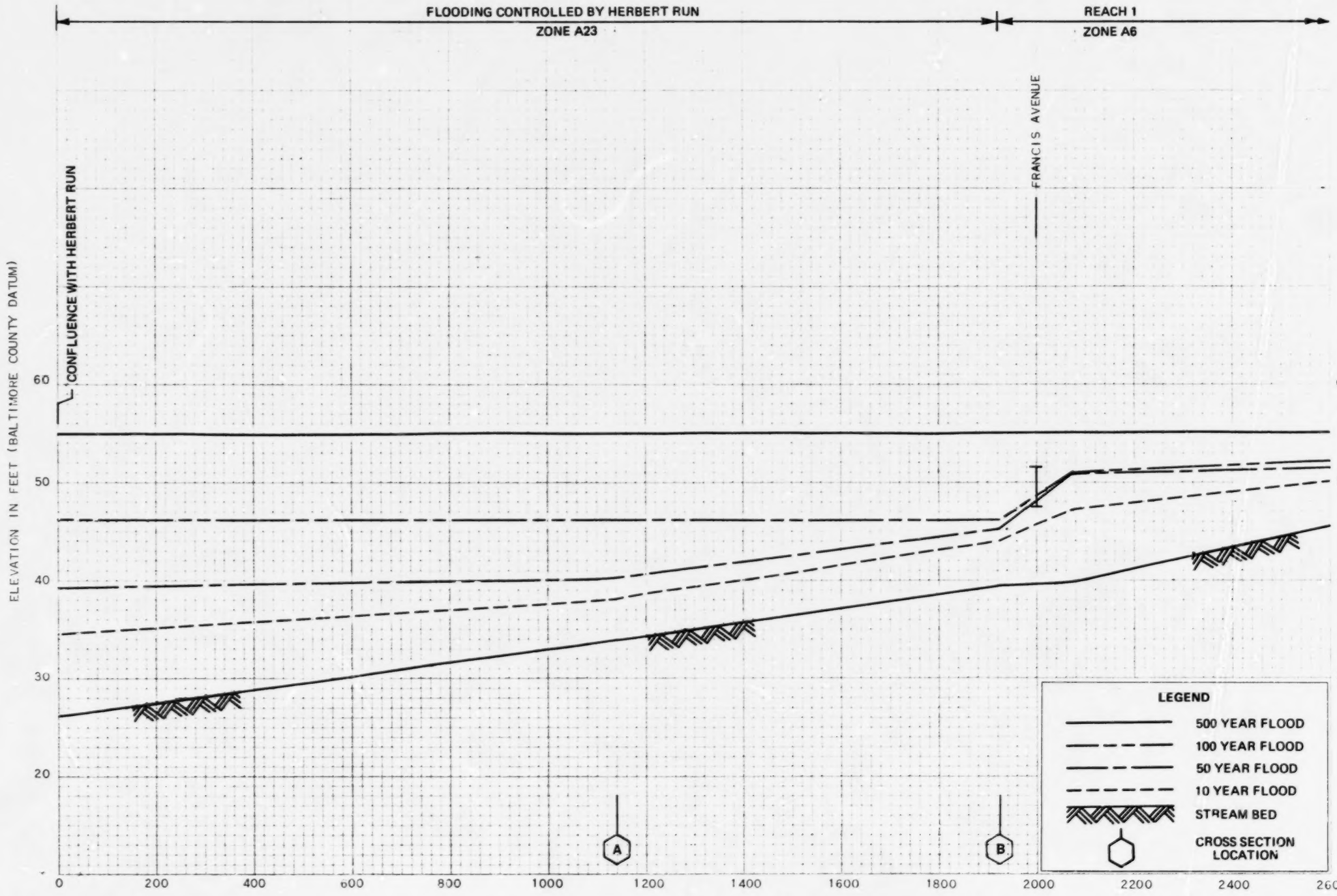
FLOOD PROFILES

EAST BRANCH HERBERT RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

BALTIMORE COUNTY, MD
(UNINCORPORATED AREAS)

25P



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FLOOD PROFILES

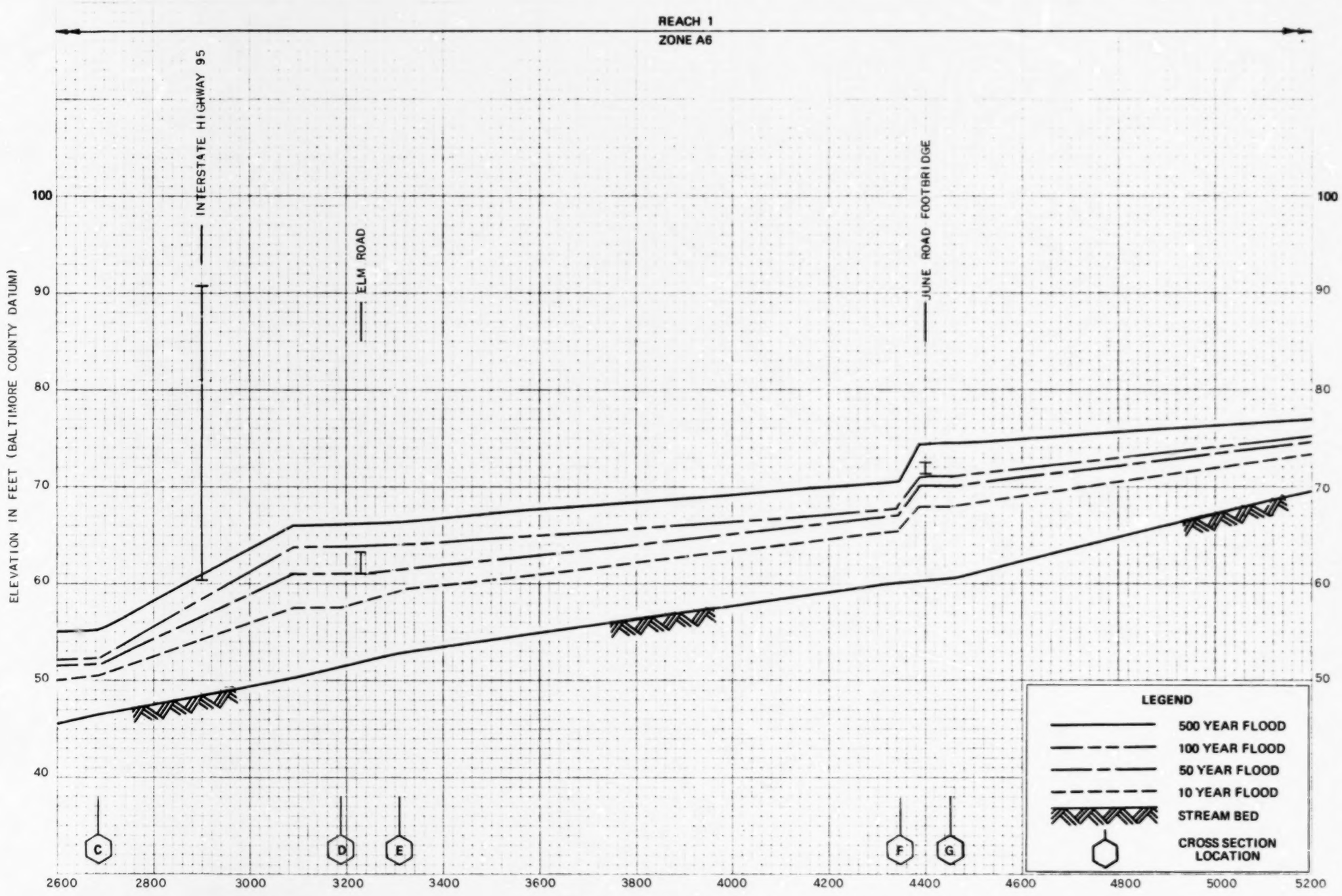
WEST BRANCH HERBERT RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

BALTIMORE COUNTY, MD
(UNINCORPORATED AREAS)

26P

REACH 1
ZONE A6



STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH HERBERT RUN

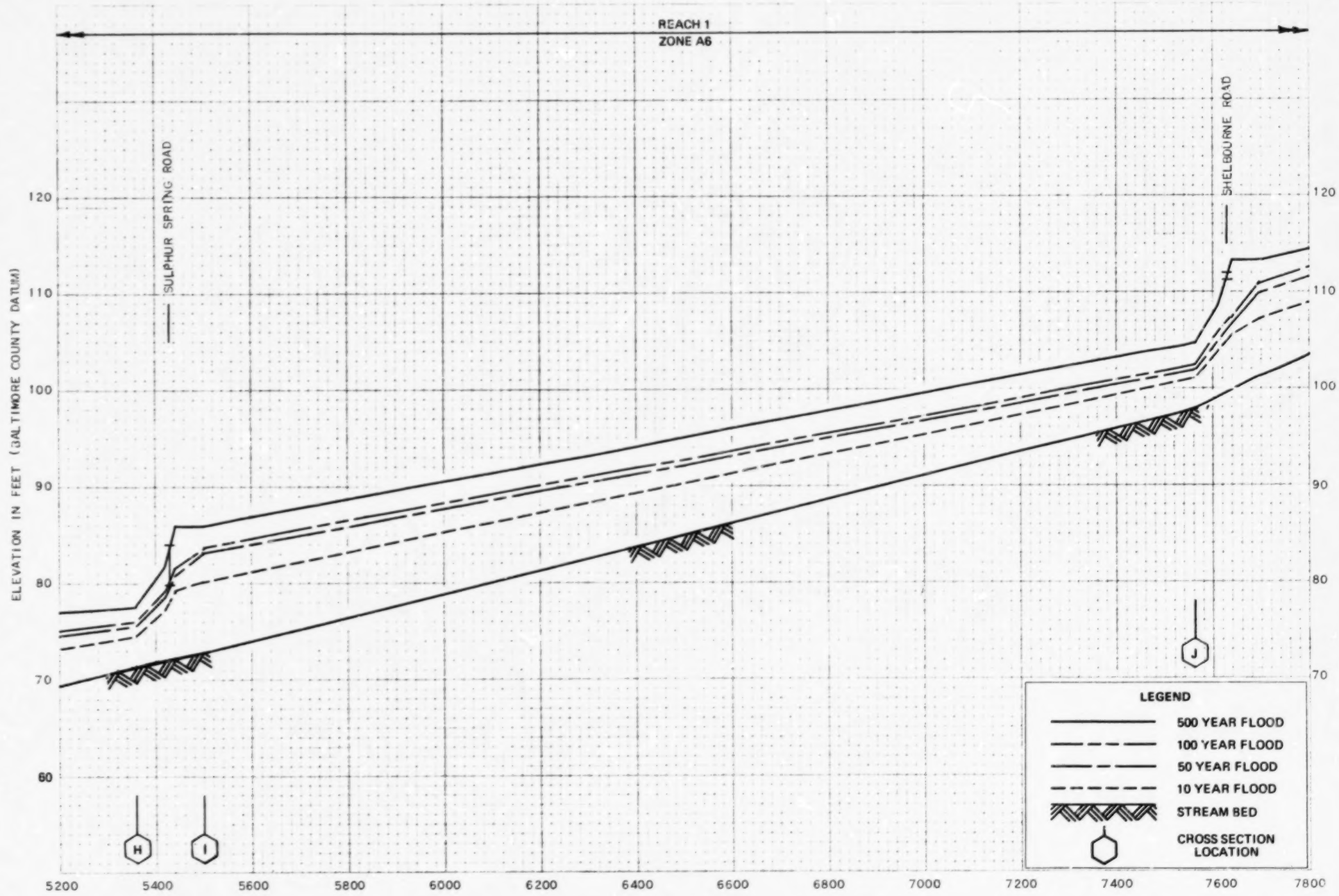
BEST COPY AVAILABLE

FLOOD PROFILES

WEST BRANCH HERBERT RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration
BALTIMORE COUNTY, MD
(UNINCORPORATED AREAS)

27P



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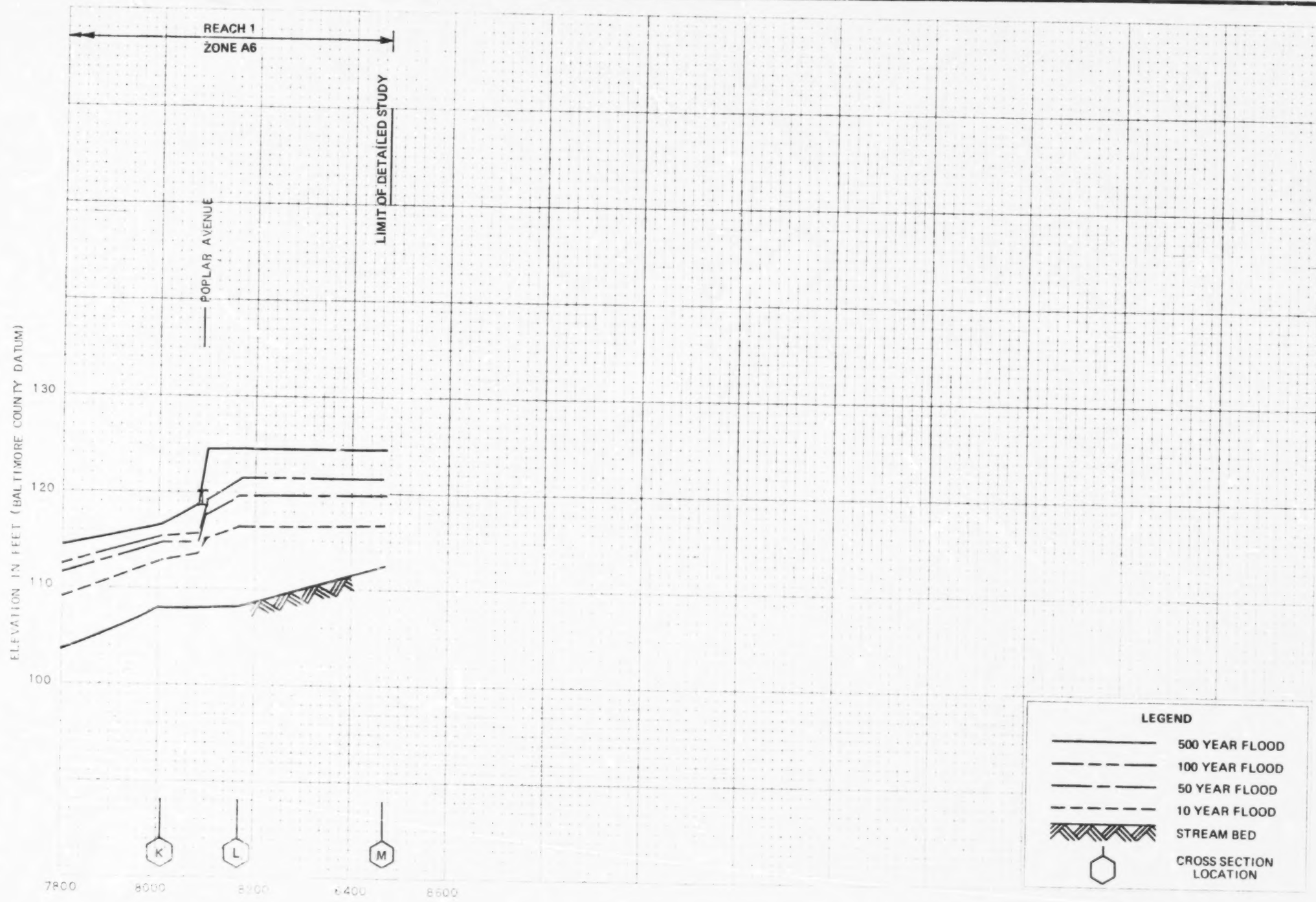
FLOOD PROFILES

WEST BRANCH HERBERT RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

BALTIMORE COUNTY, MD
(UNINCORPORATED AREAS)

28P



FLOOD PROFILES

WEST BRANCH HERBERT RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

BALTIMORE COUNTY, MD
(UNINCORPORATED AREAS)

29P

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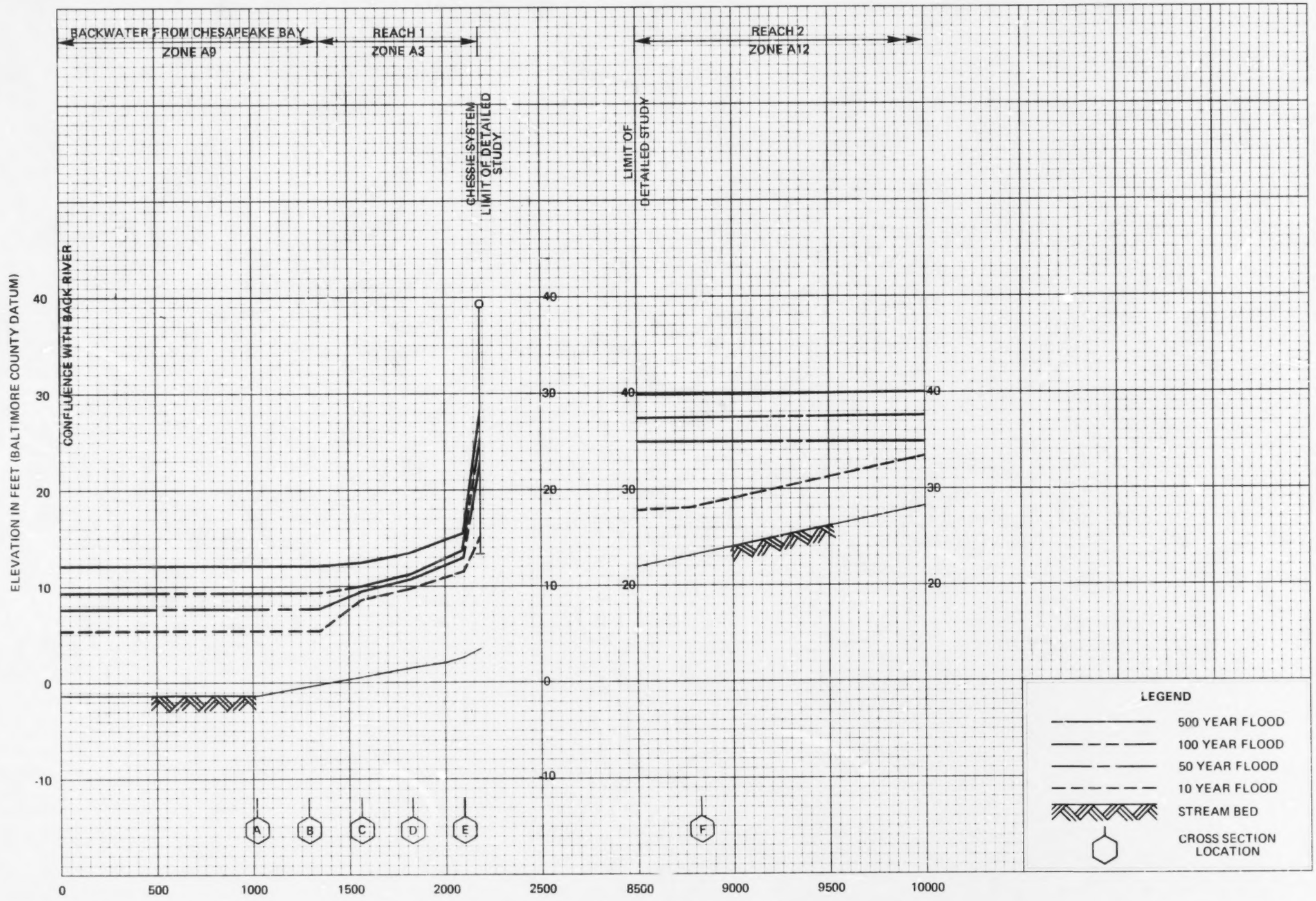

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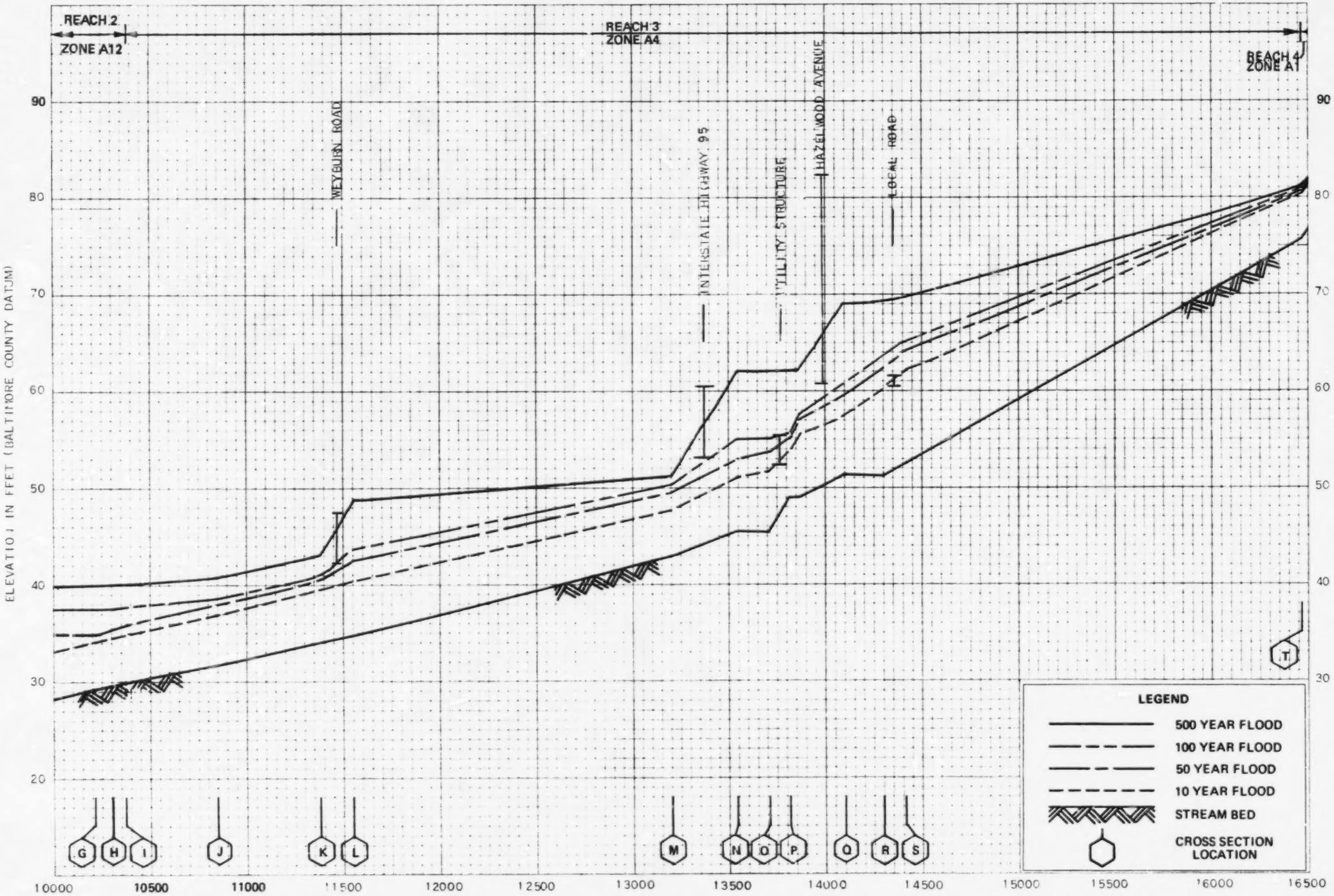
FLOOD PROFILES

REDHOUSE CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

BALTIMORE COUNTY, MD
(UNINCORPORATED AREAS)

30P



FLOOD PROFILES

REDHOUSE CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

BALTIMORE COUNTY, MD
(UNINCORPORATED AREAS)

31P

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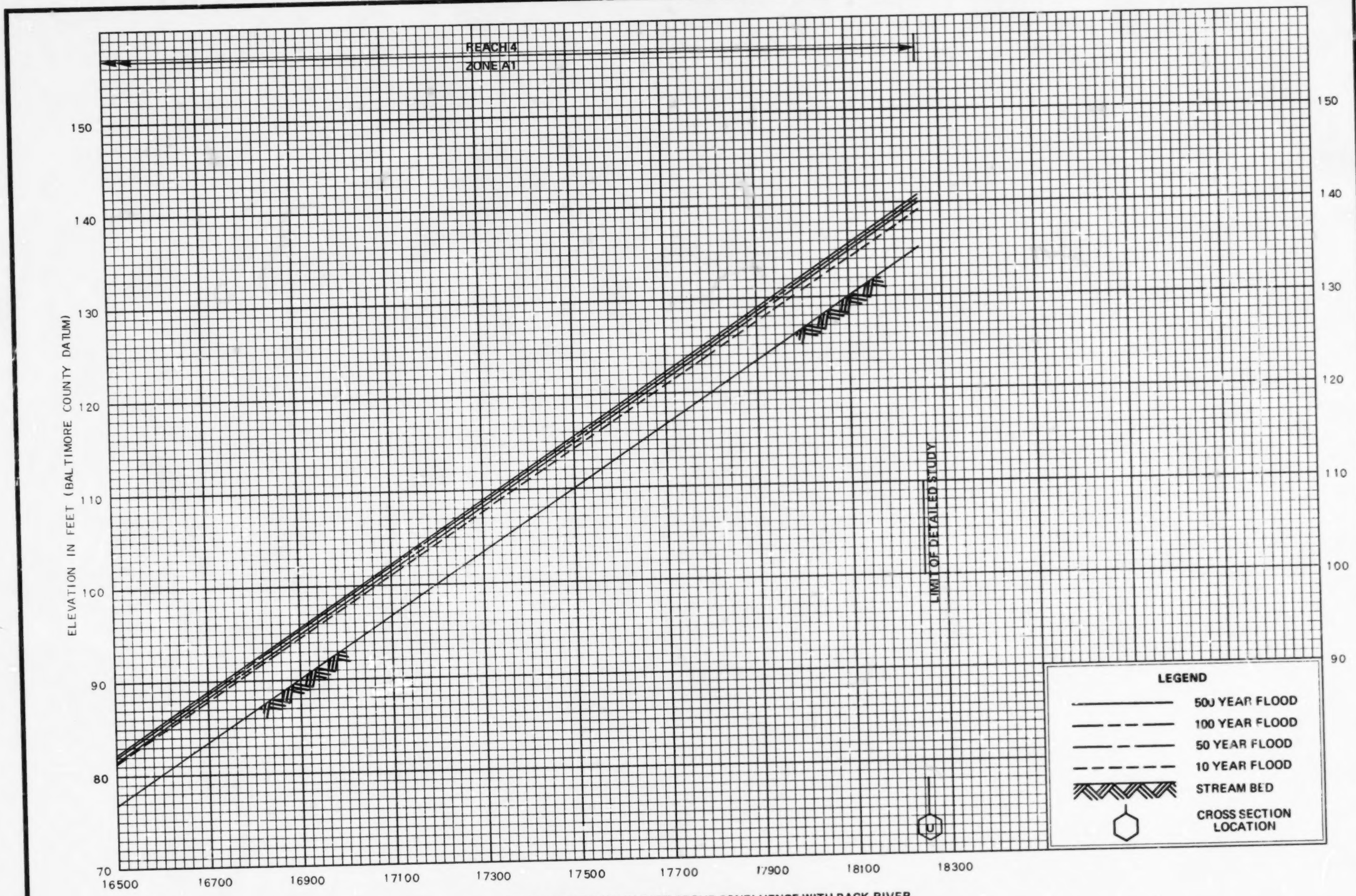


FLOOD PROFILES

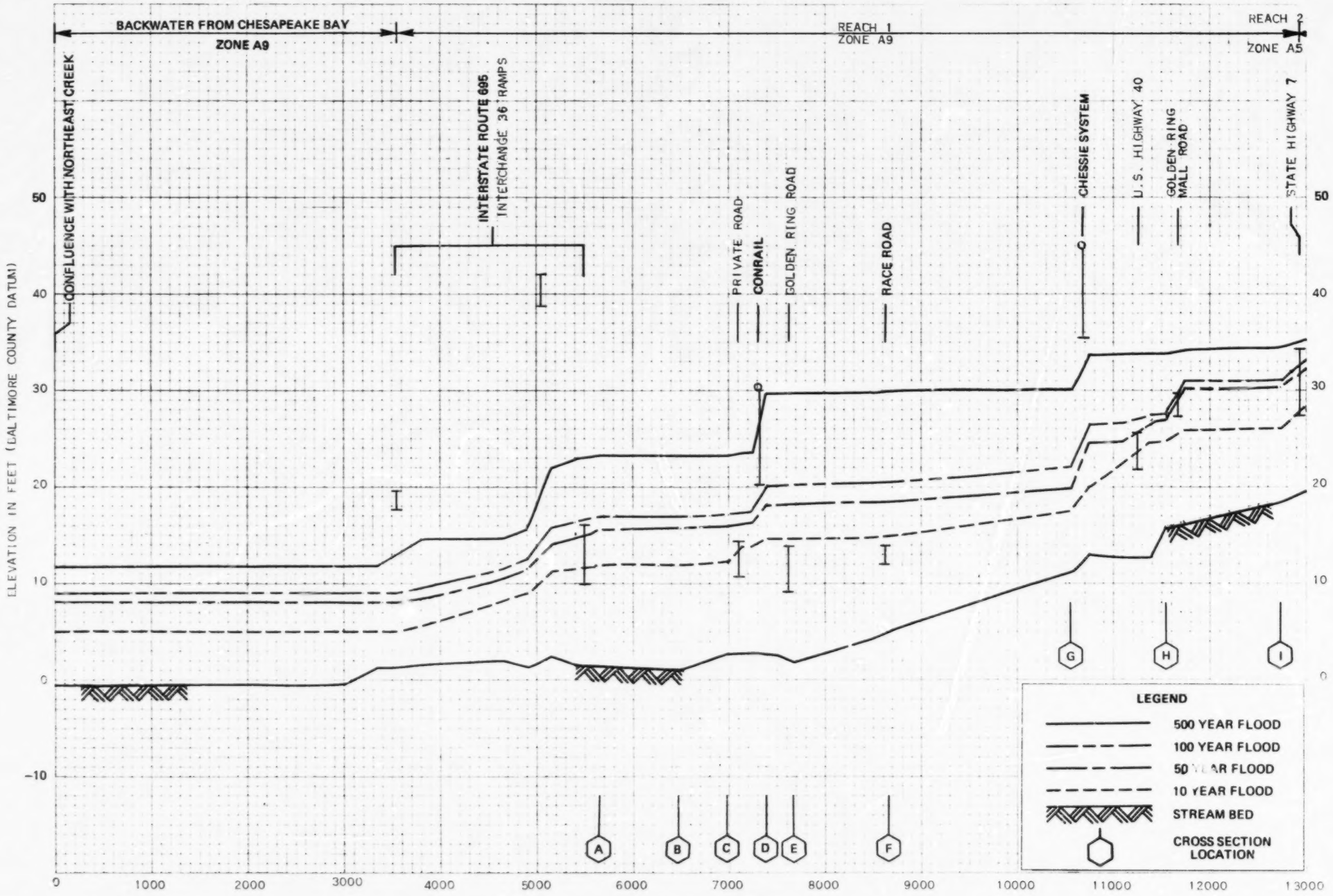
REDHOUSE CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

BALTIMORE COUNTY, MD
(UNINCORPORATED AREAS)

32P

BEST COPY AVAILABLE



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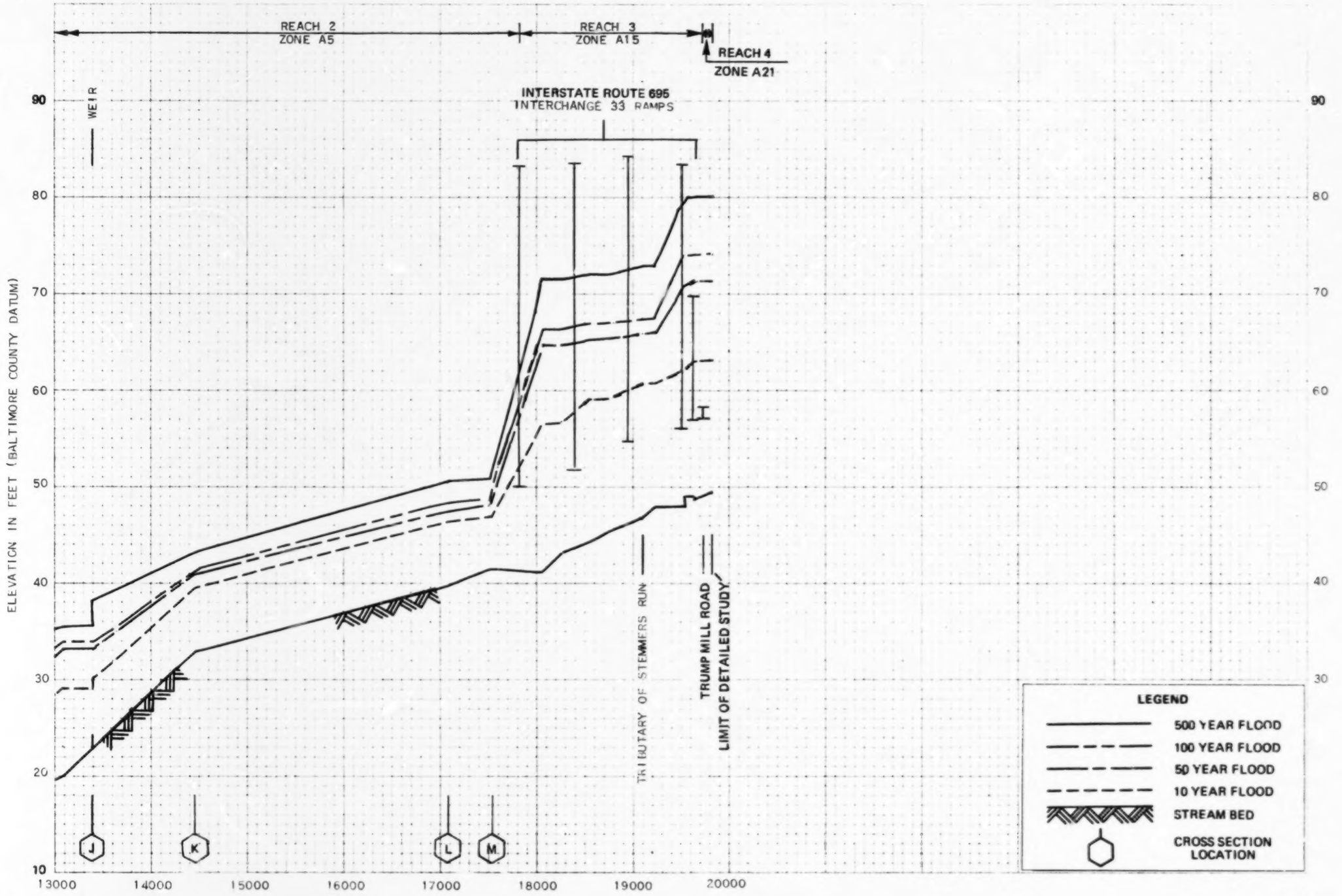
FLOOD PROFILES

STEMMERS RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

BALTIMORE COUNTY, MD
(UNINCORPORATED AREAS)

33P



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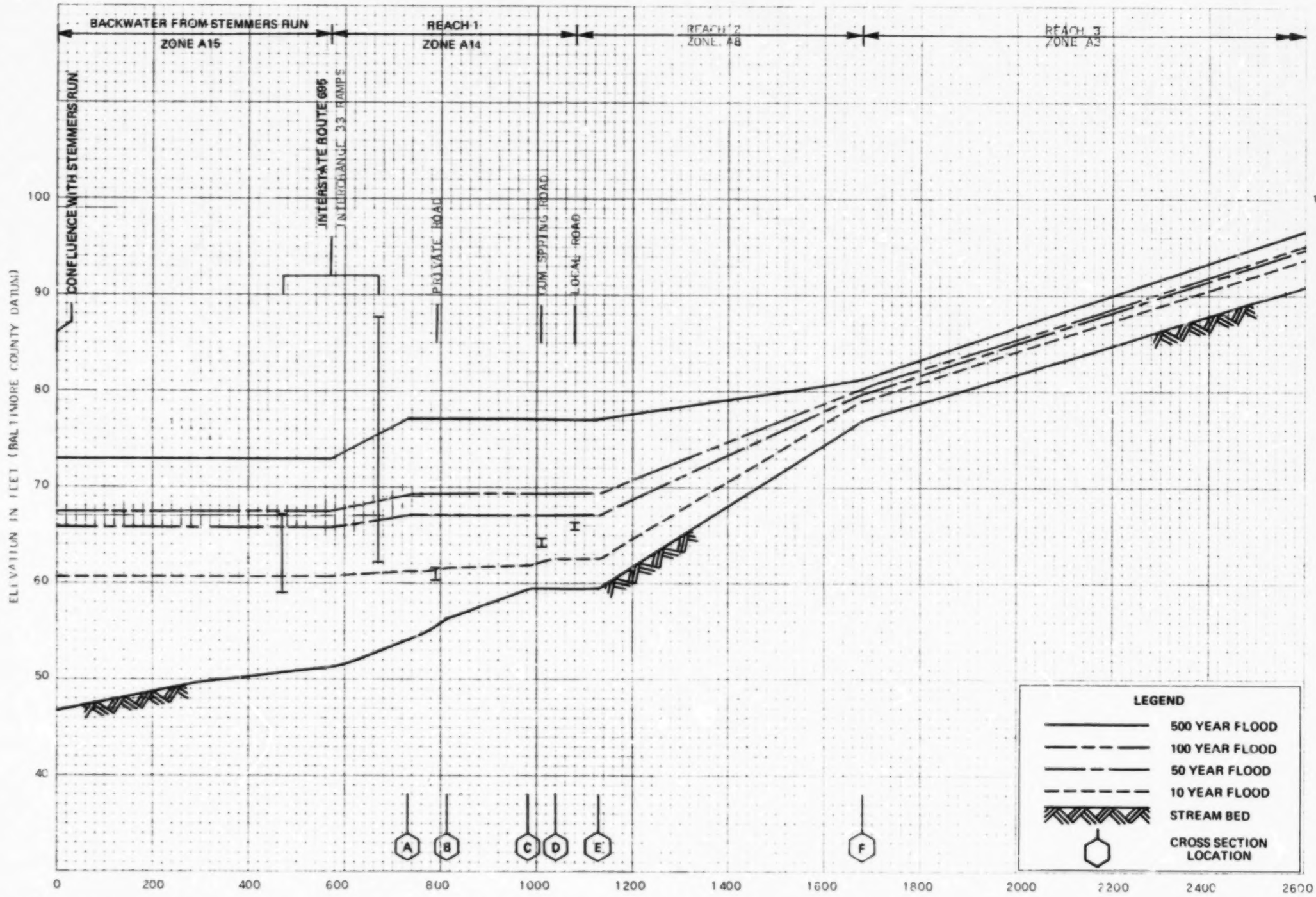
FLOOD PROFILES

STEMMERS RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

BALTIMORE COUNTY, MD
(UNINCORPORATED AREAS)

34P



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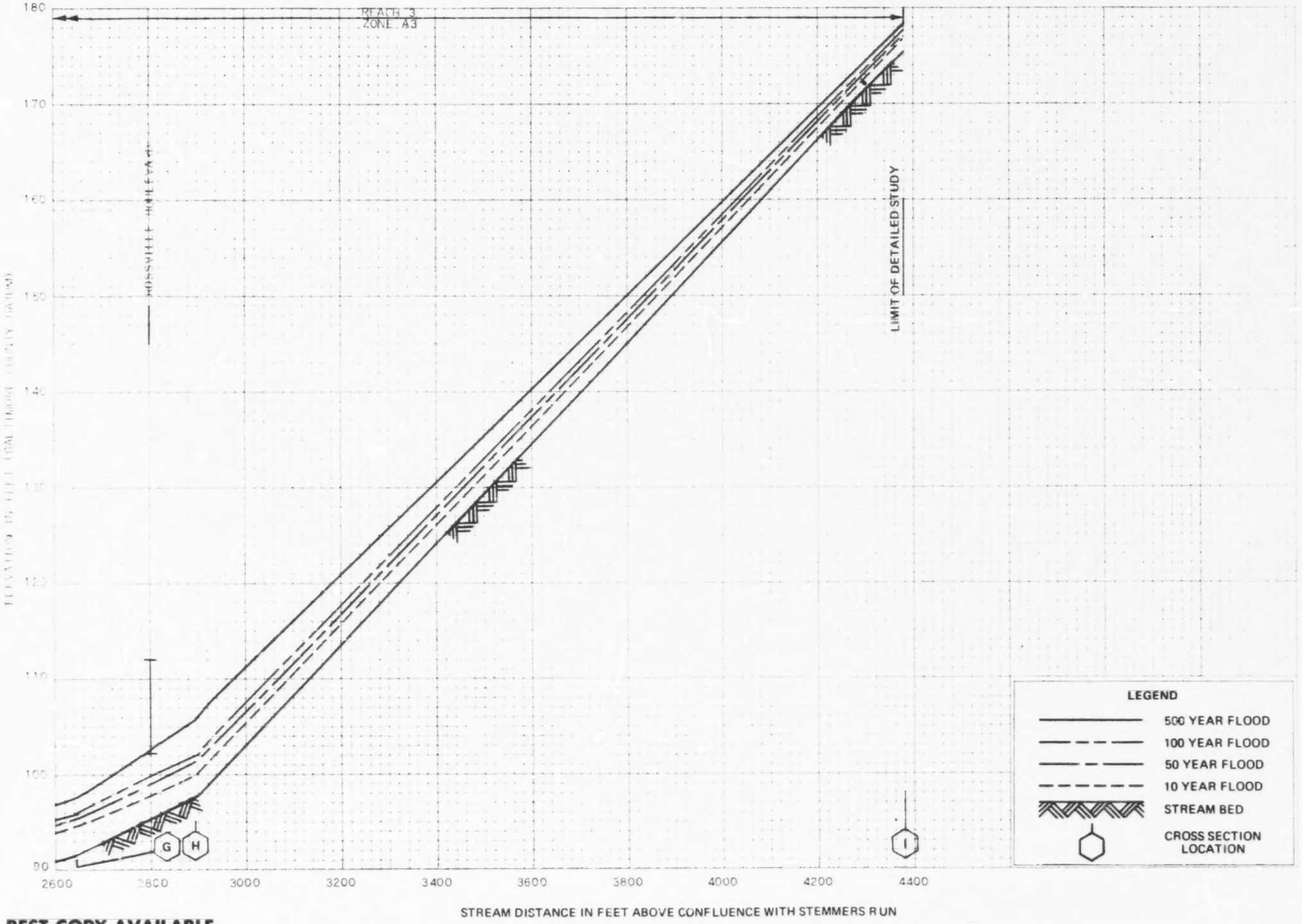
FLOOD PROFILES

TRIBUTARY OF STEMMERS RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

BALTIMORE COUNTY, MD
(UNINCORPORATED AREAS)

35P



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FLOOD PROFILES

TRIBUTARY OF STEMMERS RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

BALTIMORE COUNTY, MD
(UNINCORPORATED AREAS)

36P

85

FLOOD PROFILES

WHITEMARSH RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

BALTIMORE COUNTY, MD
(UNINCORPORATED AREAS)

37P

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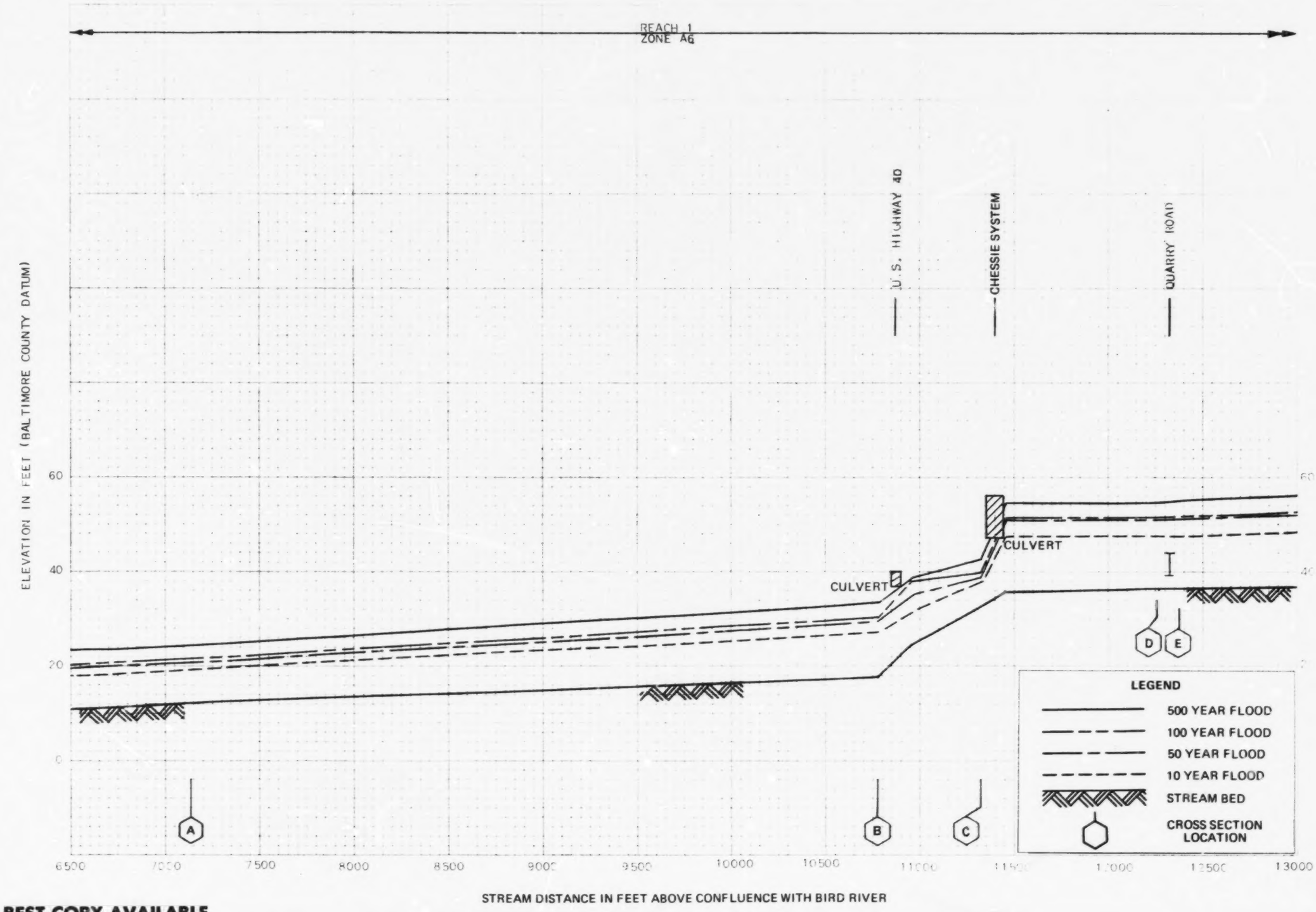

FLOOD PROFILES

WHITEMARSH RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration
BALTIMORE COUNTY, MD
(UNINCORPORATED AREAS)

38P

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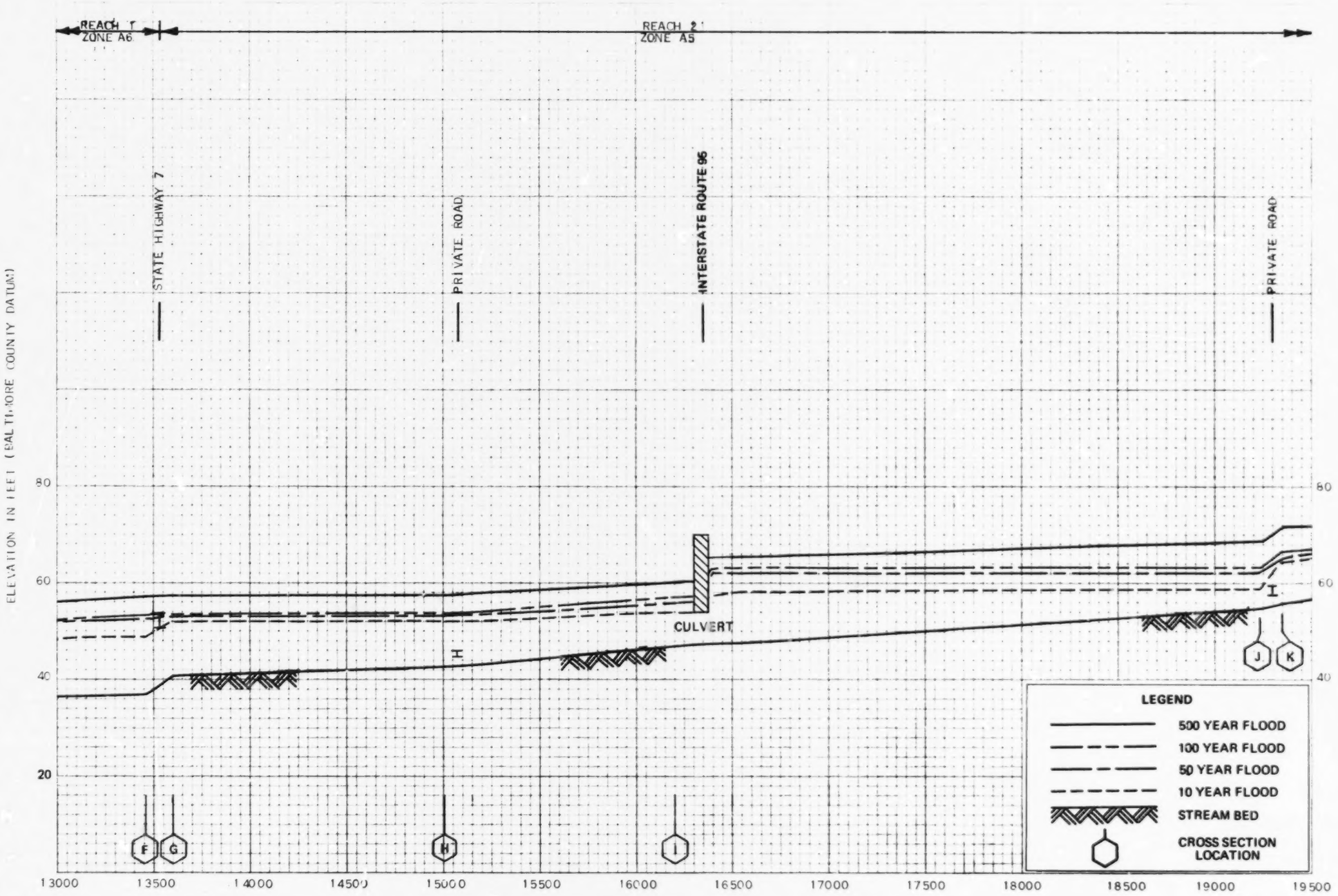

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FLOOD PROFILES

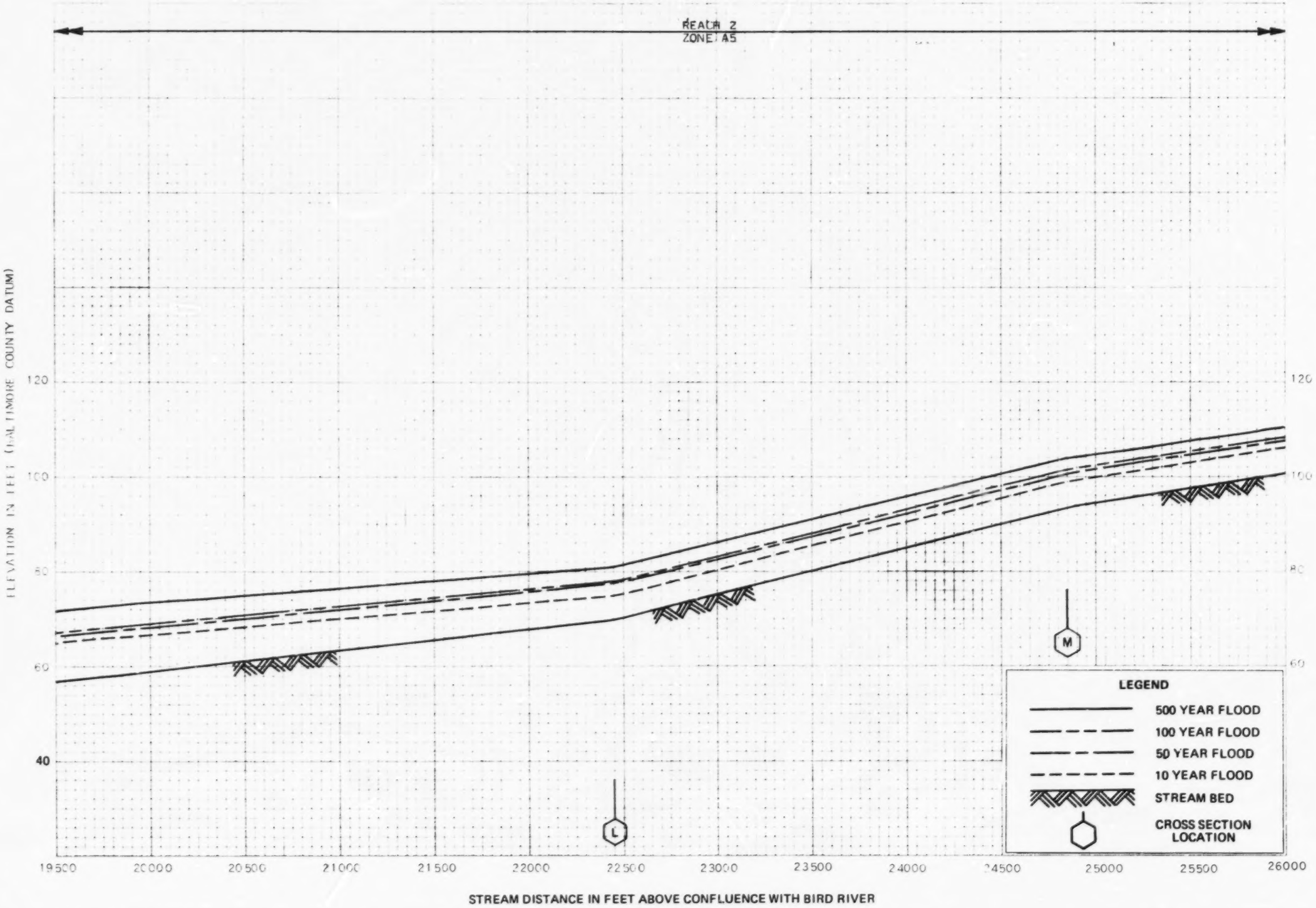
WHITEMARSH RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

BALTIMORE COUNTY, MD
(UNINCORPORATED AREAS)

39P

89



FLOOD PROFILES

WHITEMARSH RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration
BALTIMORE COUNTY, MD
(UNINCORPORATED AREAS)

40P

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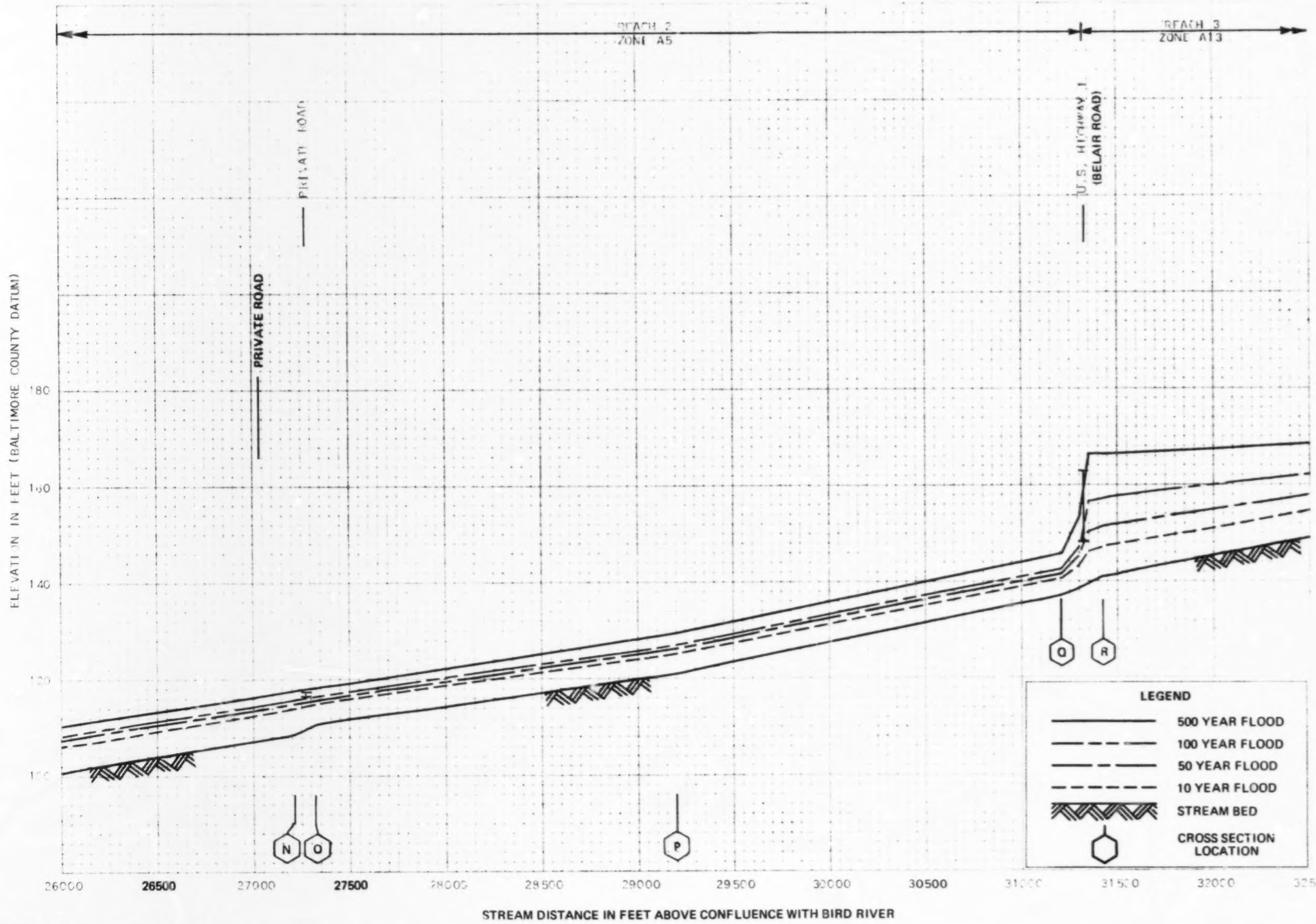

FLOOD PROFILES

WHITEMARSH RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

BALTIMORE COUNTY, MD
(UNINCORPORATED AREAS)

41P

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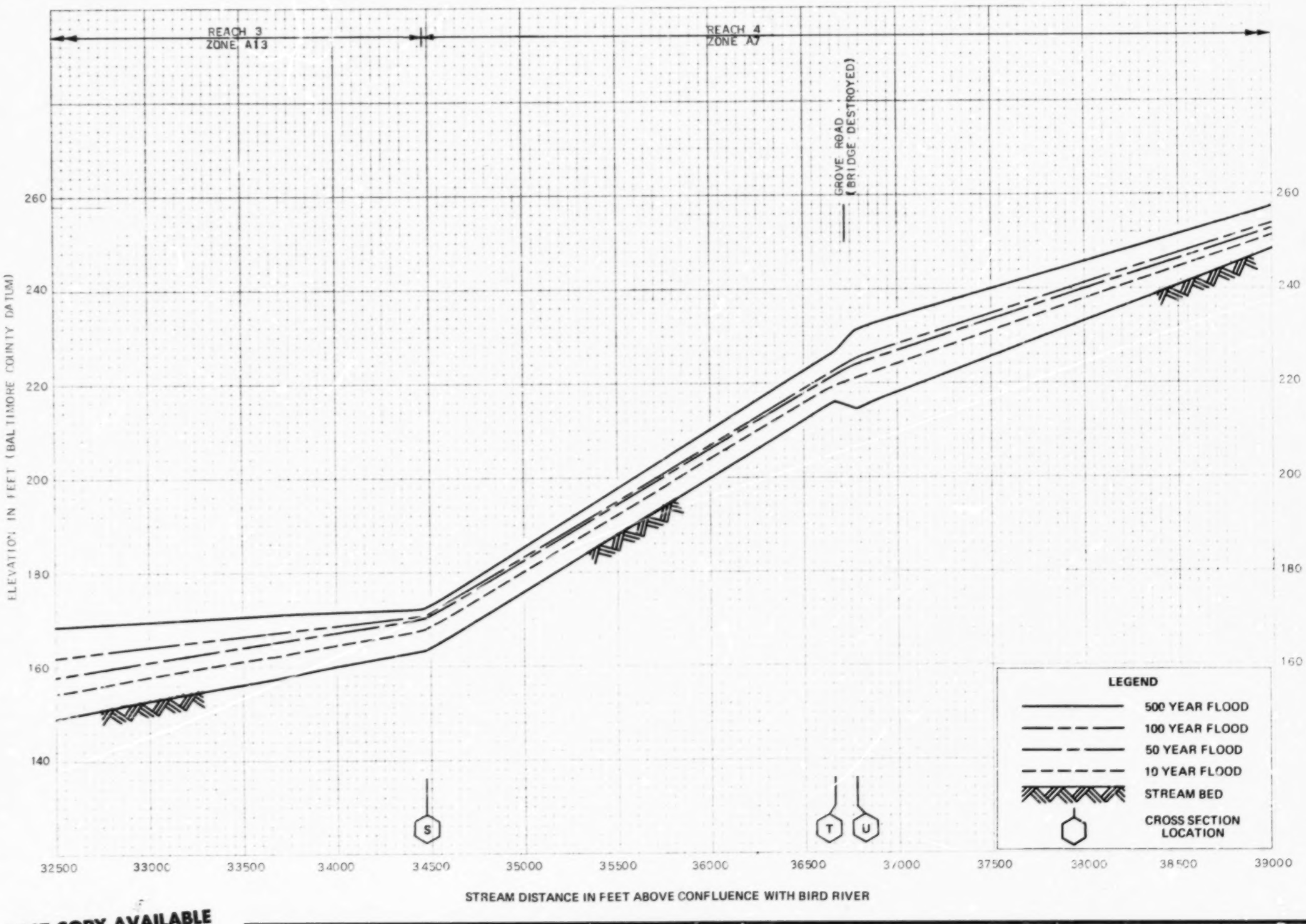

FLOOD PROFILES

WHITEMARSH RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

BALTIMORE COUNTY, MD
(UNINCORPORATED AREAS)

42P

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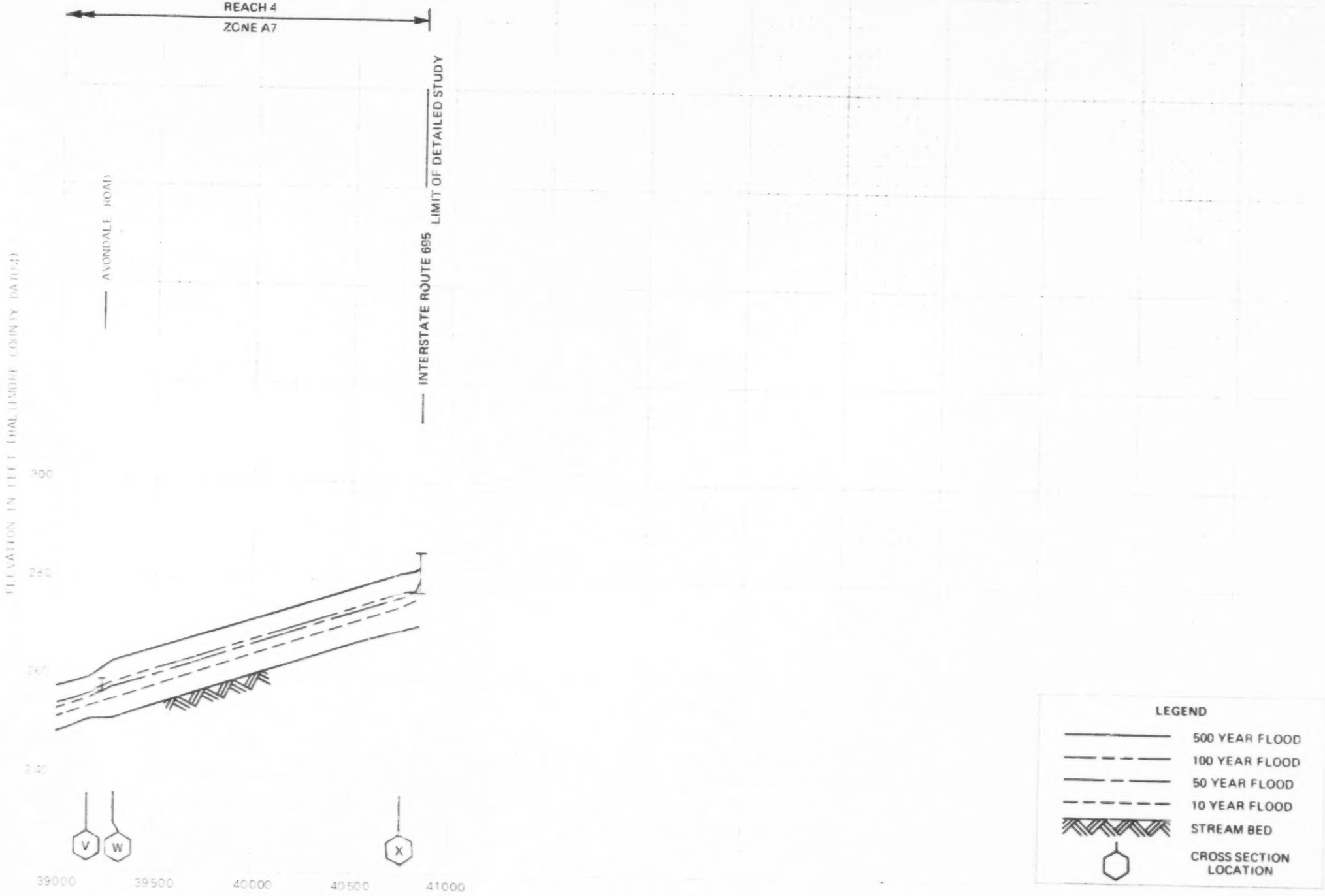

FLOOD PROFILES

WHITEMARSH RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

BALTIMORE COUNTY, MD
(UNINCORPORATED AREAS)

43P

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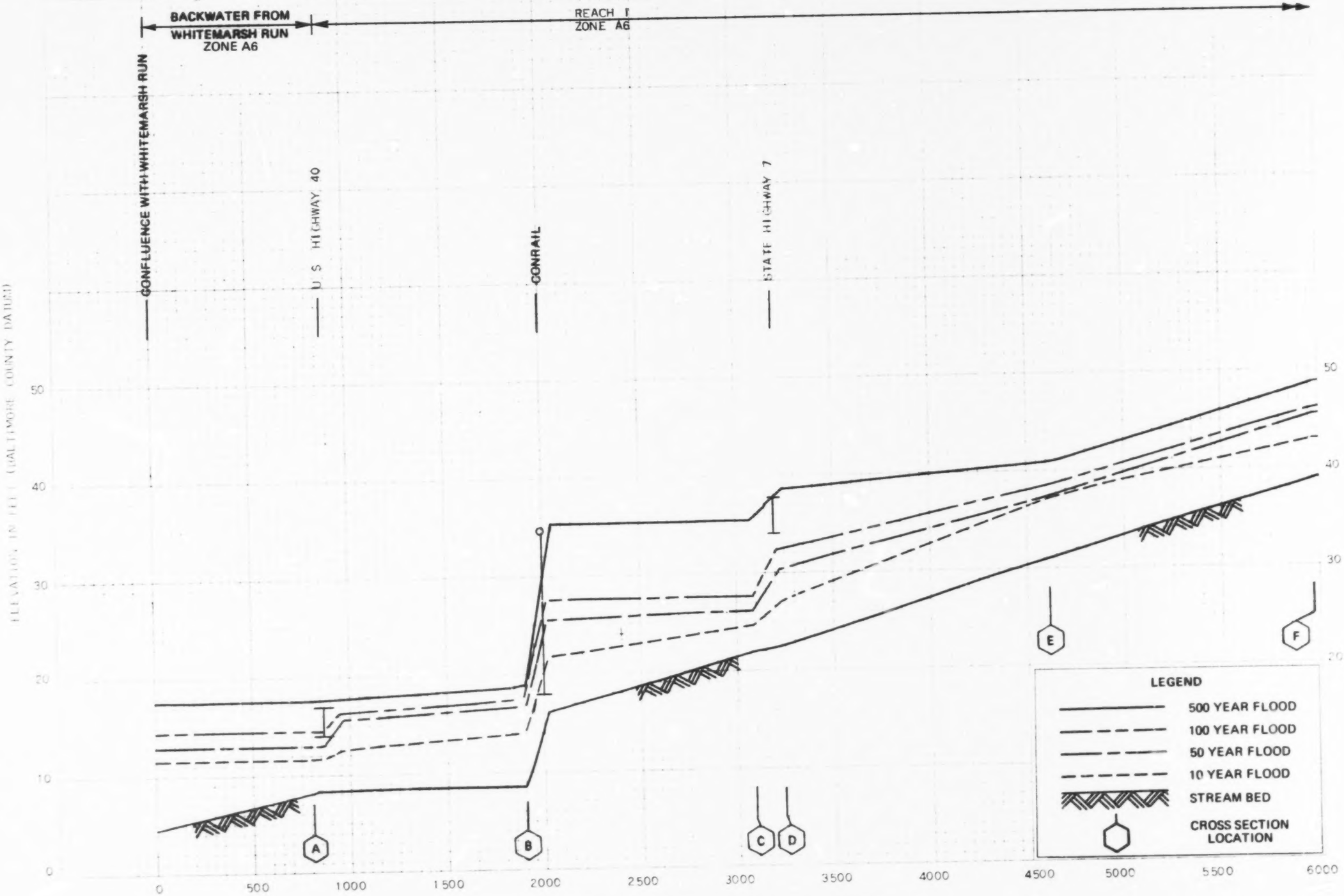

FLOOD PROFILES

HONEYGO RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

BALTIMORE COUNTY, MD
(UNINCORPORATED AREAS)

44P

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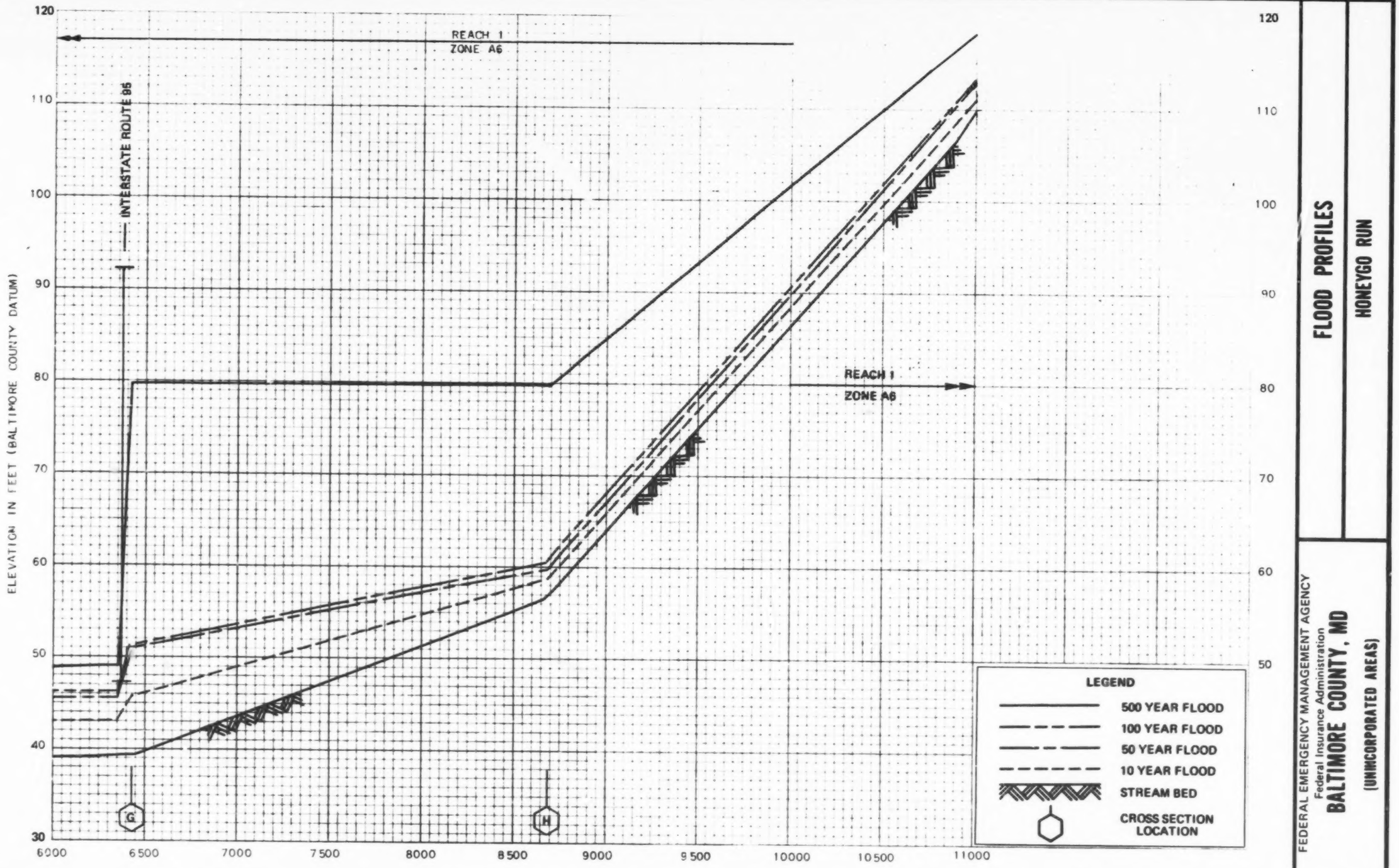

FLOOD PROFILES

HONEYGO RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

BALTIMORE COUNTY, MD

(UNINCORPORATED AREAS)

45P

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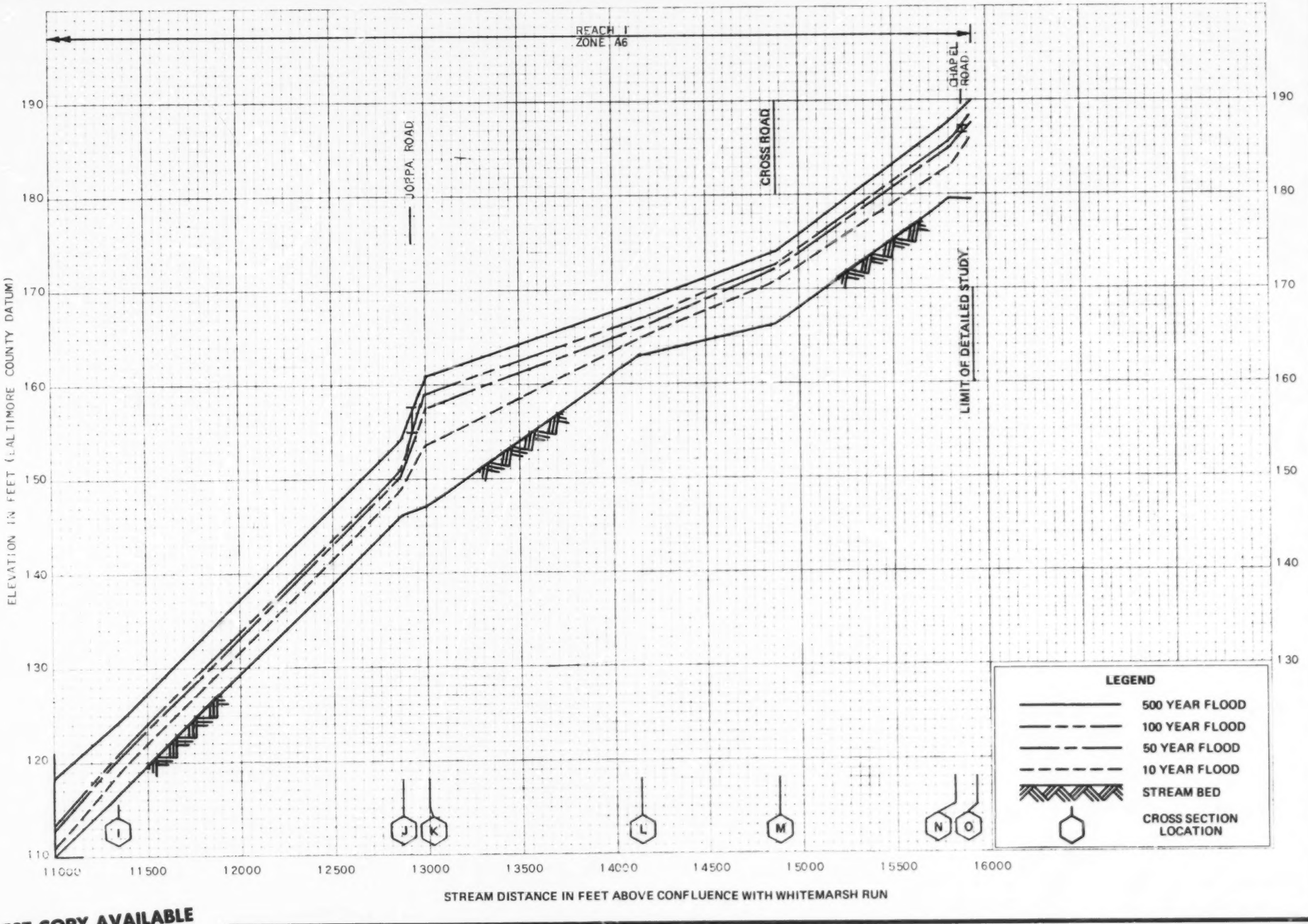

FLOOD PROFILES

HONEYGO RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

BALTIMORE COUNTY, MD
(UNINCORPORATED AREAS)

46P

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